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COMPUTERWORLD

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Washington Update

Report Calls DP at DOD Harmful to U.S. Security

By Brad Schultz
CW Staff

WASHINGTON, D.C. — The nation's security is jeopardized by the waste, inefficiency and unreliability that is legion in Department of Defense (DOD) DP facilities, according to a just-released report of the federal DP reorganization project.

Most Air Force computer sites are vulnerable to nuclear attack or sabotage, the report found, adding that adequate support — except in critical Air Force commands — "is essentially nonexistent."

The army is said to lack the quantity or quality of officers needed to develop appropriate automated tactical systems, while the Navy's management cannot effectively administer DP facilities and scarcely realizes that most Naval functions depend on DP.

The Pentagon's top administration does not appreciate that its massive DP investment is critical to national security, the report by the project's National Security Team indicated, adding that no one knows the "total dollar value" of this investment, nor fully grasps its social impact.

The team concluded that the Pentagon's DP problems cannot be solved for the long run unless systems operations and acquisitions are made far more accountable to the Office of the Secretary of Defense (OSD) through its "principal ADP review mechanism," the Directorate for Data Automation under the Assistant Secretary of Defense (Comptroller).

The directorate presently has insufficient authority and resources with which to perform its role, which was described as:

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OMB Sets Security Rules

By Edith Holmes
CW Washington Bureau

WASHINGTON, D.C. — The Carter Administration last week issued policy guidelines governing the security of computer systems operated within the federal government and by its contractors.

In draft form for several months, the guidelines place responsibility for day-to-day efforts to protect personal data and prevent fraud and abuse squarely on the shoulders of executive branch department and agency heads.

Issued by the Office of Management and Budget (OMB), which has fiscal and policy control over government computer operations, the security document also orders the Department of Commerce to compile security standards and guidelines.

The General Services Administration (GSA) will set regulations for the physical security of computer rooms, and the Civil Service Commission must establish personnel security policies for those individuals who design, operate or maintain federal computer systems and those who have access to data in these systems, OMB said.

At the heart of the policy is the concept of degrees of security measured by the "sensitivity" of the data contained in each federal system. "Sensitive data," according to the OMB memo, is information that "requires a degree of protection due to the risk and magnitude of loss or harm [that] could result from [its] inadvertent or deliberate disclosure, alteration or destruction."

Personal and proprietary in-

(Continued on Page 6)

IBM Linked to Resignation Of New Mexico DP Director

By Ann Dooley
CW Staff

SANTA FE, N.M. — Gov. Jerry Apodoca has charged IBM with influencing a consultant's report that resulted in the resignation of the sixth DP director in three years from the state Department of Automated Data Processing here. "What you can influence over a cup of coffee can be substantial," Apodoca told a news conference here recently.

The resignation came after someone leaked the findings of a once-confidential management and operations report recommending the dismissal of Stephen Malnar, who had been heading the department for little more than a year. The report was prepared by Arthur Young & Co., the consulting firm.

Malnar said the disclosure of the recommendations made it impossible for him to continue as DP director, even with full support from the governor.

The former DP director, who has since been hired as manager of systems analysts for the New Mexico Taxation and Revenue Department, contended the report group was influenced in its findings by IBM and in particular by IBM's local sales representative, Robert Krause. Malnar and Krause had not gotten along for some time, Malnar said.

The report's purpose was to examine the general structure of the department and not to evaluate personnel, "but once I started looking at an Amdahl CPU and other non-IBM equipment, things started coming apart," Malnar claimed. "I wanted to open up some competitive bidding, but IBM wanted to run the show."

In the end there was no choice left but to resign, he said.

Several other top DP employees also resigned, either in sympathy with Malnar or because of management problems within the department.

A spokesman for IBM denied that it or any of its representatives influenced the Arthur Young report. The company stated further that "IBM makes it a clear practice not to interfere in customers' personnel matters."

The spokesman did say that the New Mexico account was under review, however.

In the meantime, observers have noted that Krause, whom the governor had suggested be moved out of Sante Fe, is no longer at that office and seems to have been replaced by another sales representative.

As for the consulting firm, Richard Welsh, Arthur Young's director of manage-

(Continued on Page 8)

Firm Hits Competitor For Lax DP Coding In Lottery Award Row

By Tim Scannell
CW Staff

COLUMBUS, Ohio — A printing company seeking to nullify a $2.3 million lottery ticket contract awarded to a rival firm by the state controlling board here has challenged that firm's competency by allegedly breaking the DP-generated code it used to print lottery tickets for another state.

The contract awarded to Marketing Corp. of America (MCA) Games, Inc. of Westport, Conn., calls for printing 40 million tickets for an upcoming Ohio instant game called "Three of a Kind," according to David Harbarger, the lottery's director. At this point, Harbarger said, regardless of the other firm's criticism of MCA's security, "we're proceeding forward in our normal course" as stated in the contract.

The controversy erupted when an attorney representing the rival firm, Scientific Games, Inc. of Atlanta, Ga., approached the board and asked that the contract with MCA be disapproved. He then distributed to each board member a lottery ticket printed by MCA for sale in Maine's state game and announced that Scientific had discovered MCA's serial number sequence and thereby broken its code.

On each ticket, Scientific printed the numbers it predicted would appear after the graphite coating concealing each "secret" number was scratched off. In every instance, the number hidden by the graphite coating matched

(Continued on Page 4)

Eyeing Small Businesses, DEC Opens Retail Store

By Ronald A. Frank
CW Staff

MANCHESTER, N.H. — With its latest systems on the showroom floor and salesmen promising immediate off-the-shelf delivery, Digital Equipment Corp. opened its first retail store here last week.

Located in the Mall of New Hampshire — a large shopping center with some of New England's finer stores — the DEC store is aimed at explaining the benefits of computer use to potential first-time users. Most are expected to be small businessmen, according to DEC founder and President Kenneth Olsen.

"Digital" will sell small business systems, word processing systems and supplies. Facilities for customer training courses will be provided, as will a word processing service bureau to help small businesses meet their document preparation requirements.

According to Stanley C. Olsen, vice-president of DEC's Computer Products Group, the store is aimed at an estimated 10,000 small businesses in New Hampshire that have three to four employees and bring in revenues of $200,000 to $300,000 per year.

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Adapso at House Hearings

Curbs Urged on Bell DP Activities

By Ronald A. Frank
CW Staff

WASHINGTON, D.C. — It would not be in the public interest to trade AT&T's exit from certain telecommunications manufacturing activities for its unlimited entry into computer services or computer manufacturing, according to the Association of Data Processing Service Organizations (Adapso).

Testifying at the continuing hearings on the proposed rewrite of the Communications Act of 1934 [CW, July 31], Fred S. Lafer, vice-president of Automatic Data Processing, Inc., speaking for Adapso, said any entry of AT&T into DP areas "would simply be trading one problem for another."

Growth and technological innovations in the DP services area have taken place in an unregulated environment and while the 1956 Consent Decree has been in effect.

AT&T's role should clearly be a provider of services to the DP industry and not as a replacement for that industry, Lafer said.

The proposed legislation describes activities that are incidental to communications, Lafer said, but in Adapso's view it would be more appropriate to view "telecommunications as incidental to DP."

If the Consent Decree is "vacated," the contrary will be found to be the case. Thus Adapso suggested that hearings be conducted to determine what influence a change in the Consent Decree would have on the DP services area.

Industry Vitality

The vitality of the industry today has resulted, in large part, from the ease with which a company can enter the field, and this condition should not be altered. If, after hearings, it is determined that AT&T can be permitted to enter the DP services area, it should be allowed to do so under principles of maximum separation, Lafer told the subcommittee.

Related story on communications hearings begins on Page 9.

In broad terms, maximum separation means a carrier and its affiliate must have separate operating personnel, facilities and books of account. On a more practical level, it means the carrier and its affiliate cannot engage in joint procurement, financing, advertising or any other activities that would give the affiliate the advantages enjoyed by the carrier because of its size and resources, Lafer said.

On Cbema's Behalf

Speaking for the Computer and Business Equipment Manufacturers Association (Cbema), president Vico E. Henriques testified that all DP services and equipment as well as customer-provided equipment should be excluded from regulation under the proposed legislation. The only services that should be regulated by the Communications Regulatory Commission (CRC) are those including basic switched and private-line offerings, which do not involve a "significant delay" between point of origin and destination and are received in the same format, speed and code as originated.

Cbema also supports deregulation of the resale of carrier services, Henriques said.

When regulated carriers compete with unregulated entities for equipment and services, it is essential that "fair marketplace competition" be assured. The proposed act should include the intended meaning of such terms as "noncompetitive," "competitive" and "telecommunications." Other words and phrases in the bill also require such clarification, he said.

Substituting new terms to be used as guidelines in judging tariffs creates major uncertainty and is unwise, Cbema said.

Oshman Testimony

Another witness was Dr. M. Kenneth Oshman, president of Rolm Corp., who appeared as a spokesman for the American Electronics Association. Oshman said a company that provides both competitive and noncompetitive services should be regulated by the CRC and not exempted from the antitrust laws.

But at the same time, it would be a mistake to rely solely on the antitrust laws to discourage anticompetitive practices by the dominant carriers. Antitrust laws and proceedings are too costly and time-consuming to be of practical value to a small company trying to challenge an industry giant, Oshman said.

Because of these dangers, the bill should provide for a transition period during which the Bell System would be fully regulated in competitive markets, he suggested. Once a company has been deregulated, it could not later return under the regulatory umbrella, he added.

In any case, market forces are not sufficient to ensure full and fair competition between new competitors and dominant industry giants, he said.

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EPA Begins Survey on Rural Drinking Water

By Tim Scannell
CW Staff

ATLANTA — Are rural Americans drinking water that doesn't meet national and environmental standards? Do people in the higher socioeconomic brackets enjoy better quality water than others?

These questions are part of an intensive survey being conducted by the Environmental Protection Agency (EPA). The study, authorized by Congress in the Safe Drinking Water Act of 1974, will use a computer to correlate the data collected from personal interviews of the residents of more than 2,400 households in 400 counties across the nation, according to EPA project director Philip Tate.

Earlier studies have been performed by several states, but those investigations were "not quite as broad or as searching. In one sense, this is a fairly modest study . . . but in another, it's a fairly heavy item because it is a national survey based on a very structured statistical design," Tate said.

The interviews consist of approximatley 150 "carefully structured questions" and are scheduled to be completed by November, Tate said. The entire analysis will be compiled as a first draft report in mid-spring, he continued, and will be presented to Congress for its consideration sometime late in the summer of 1979.

Each home polled in the project represents approximately 18,000 similar households or specific areas of real estate, Tate said. EPA surveyors ask subjects questions dealing with their water's appearance, smell, taste and origin. In addition, the interviewers are instructed to take water samples from each home to be analyzed at regional laboratories.

Although the study is described as being "the largest of its kind," project coordinators are reluctant to classify it as the foundation or groundwork for some future federal program. Such a program would not develop unless something is discovered to be "completely out of hand, which I certainly can't imagine," Tate said.

For instance, if in a given geographical area the water analysis found "certain constituents present at a certain level," then a more elaborate study of that particular geologic-formational area might be generated, he explained.

Defining Problem Areas

This particular study, however, is basically "an opportunity to define where the problem areas exist in terms of the regions — Northwest, Southwest and so on — and to evaluate whether additional studies should be performed, Tate explained.

"I think, more or less, the project is the first structured investigation of rural drinking water on a national level. We really don't have any preconceived line of action" and probably won't have until the final results are available, Tate said. Congress has authorized the EPA to make recommendations based on the results of the study, but "we have to wait until the analysis and interpretations are completed before we really have a handle on what suggestions might be appropriate."

Interview data and the results of the water sample analyses are input to an IBM 370/168 located "off campus" at the Computer Services Department of Cornell University. The 3M-byte machine has a combination of peripherals including a number of IBM 3330/3333 and Memorex Corp. 3673/3675 disk drives.

The system is accessed either by one of several terminals scattered throughout the Cornell campus or via punched cards in a batch mode, a spokesman said.

The computer will "cross up, pair and recross" the subjects' answers and transfer the data to magnetic tapes. The tapes, containing all of the "raw data or demographics and socioeconomics of the water study analysis, will then be run through an analytical program developed by Cornell, Tate stated. The output of the program will then be interpreted "as to what all this may mean or perhaps doesn't mean" in relation to national water quality.

The study is based on several hypothetical questions concerning the present state of drinking water, Tate said, and Cornell's program and the computer are structured "to arrive at answering or at least validating these hypotheses in some way."

Firm Seeks to Nullify Lottery Contract

(Continued from Page 1)

the prediction inked in by Scientific.

Jim McManus, chairman of MCA, contends that Scientific's "demonstration" has no bearing whatsoever on the security of the future lottery contest. The situation in Maine — in terms of the level of security or the kinds of games it's interested in — and the game situation in Ohio are as similar as "Germany is to France," McManus remarked.

Although MCA's McManus declined to elaborate on the situation because of an injunction filed by Scientific naming MCA, the lottery commissioners and the Attorney General, he did imply that MCA was aware of just how his firm's code was discovered.

"We know exactly what [Scientific] did because we do exactly what it did to its tickets." All it is doing, more or less, McManus said, "is predicting numbers on common tickets, and that's a very standard thing."

On the other hand, Jim Trucks, Scientific's vice-president and general counsel, contends MCA's Maine game was unusually easy to break — taking "approximately five minutes" — and that this reflects unfavorably on the security level of the proposed "Three of a Kind" contest.

Trucks refused to comment on exactly how the code was broken, labeling it "proprietary information," although he did admit the board members were "shocked" by Scientific's demonstration.

In most "game" schemes, the codes that determine the frequency and location of winning tickets in a series are directly related to the serial number printed on each ticket.

"When we say we've broken (the code), let's just say we can tell what's under the spot without defacing the tickets in any way," Trucks explained. "Any ticket can be broken given enough time and money and effort," he continued, "but certainly one is secure where it takes so much time and money and effort that it becomes economically unfeasible to fool with it.

"We believe our ticket is entirely secure in the accepted sense of the word," he added.

'Game-Oriented' Service Bureaus

Both Scientific's and MCA's number sequences on the lottery tickets are generated by computers in separate "game-oriented" service bureaus in different parts of the country, according to McManus and Trucks. Although both firms declined to describe their configurations, Trucks did say Scientific uses a Data General Corp. system.

"The tickets are printed with computer-driven ink-jet printers," Trucks stated. "The lottery numbers as well as the serial numbers are printed with the spray-jet which gives each ticket a unique number."

Samples of the lottery tickets for the "Three of a Kind" game, scheduled to begin sometime in mid-November, have in the meantime been submitted to an independent testing laboratory that will attempt to "crack" MCA's security and possibly substantiate Scientific's claims. McManus believes, however, that his products will survive the laboratory's scrutiny.

"We all use the same labs and some of us use more than one," McManus said. "We put our tickets through a more rigorous pretesting than Scientific does and we feel pretty confident our tickets are secure in the context of the practices of the industry."

The lottery director declined to comment on whether the future of the Ohio state game and the selection of supplier is dependent on the testing lab's results.

Scientific has even raised the question of partiality on the part of the lottery commission. "The director of the lottery is very favorable toward MCA," Trucks said, "even though it seems to us it will be a terrible embarrassment to the lottery if it goes ahead" with its plans.

MCA charged, however, that Scientific is upset over the contract award because MCA has only four states as clients while Scientific serves 12.

"It's very unusual for the vendor or supplier to sue the Attorney General in a state in which it bid under fair and open rules and was unsuccessful," McManus noted. "We're 'the new boys on the block' for Scientific and I guess I would regard its claims in Ohio as the desperate cries of a competitor in the marketplace."

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TALLY PRINTERS

Finds Records Inadequately Protected

GAO Urges Prompt Buttress of SSA Security

By Edith Holmes
CW Washington Bureau

WASHINGTON, D.C. — Health, Education and Welfare Department Secretary Joseph A. Califano Jr. should act "immediately" to correct weaknesses in the Social Security Administration's (SSA) telecommunications system and to ensure that the financial and medical records of millions of Americans are safe from harm, destruction or alteration, the General Accounting Office (GAO) said.

In a report released here recently, the congressional audit agency identified telecommunications system design and management problems that have led to "security weaknesses" in the federal government's operation of national retirement and disability insurance programs and in its administrative support for the Medicare program.

In addition, the GAO found that SSA, one of the largest federal repositories of personal information — it has records on more than 170 million citizens — hasn't adequately protected files disclosing individuals' lifetime earnings, wages, unearned income, real estate holdings, marital status, drug and alcohol use and detailed medical information.

SSA Agrees With GAO

Since GAO began its review of the SSA at the request of Representatives John E. Moss (D-Calif.) and Charles Rose (D-N.C.), Social Security has initiated an active security program.

"We agree with the [GAO's] recommendations, and we have already taken steps to ensure that personal information in our computer system is made more secure," Don Wortman, acting SSA commissioner, said.

The SSA established a permanent system security staff in Feburary 1977. That group has issued several publications on computer security and has conducted security reviews of 200 of the administration's more than 1,300 field offices.

Although pleased by Social Security's increased sensitivity to the need for computer and record security, the GAO contended there was no active security program when the audit began in 1976.

The audit agency's review of SSA found beneficiary files could be created as well as queried from most of the 3,900 terminals linking SSA, state welfare agency and private insurance company offices across the country.

With few exceptions, individual employees could gain access to information in beneficiary files and even create new files without being required by the telecommunications system to identify themselves. An audit trail feature designed into the system to identify specific users was an "option" and so was not used in most offices, the GAO said.

Social Security regularly submits beneficiary information to the states for their use in administering welfare programs and to insurance companies in the operation of Medicare. These organizations, in turn, distribute the information to their local offices. "Social Security has not determined if adequate security is provided in these situations," the GAO said.

The SSA has generally resisted the idea of checking the security backgrounds of its personnel, but the GAO recommended that sensitive positions be identified and background checks be required because of recent incidents involving Social Security employees.

In one instance, for example, an SSA employee sold information to a company in the business of locating missing persons, the GAO reported. In another, two SSA field office employees fabricated 14 different beneficiary accounts and processed them for payments of more than $55,000 before their actions were discovered, the report stated.

The security of benefit files may be threatened in still another way not identified by the GAO report. In a December letter to Moss, SSA Commissioner Wortman pointed out his agency regularly provides information about an individual without the subject's consent to a number of federal and state agencies.

1974 Privacy Act

These "disclosures" fall under the Privacy Act of 1974, which permits the exchange of information between agencies regularly using the data to administer their programs. The exchanges, therefore, are legal, and the SSA and other agencies have procedures for ensuring that personal information is safeguarded, Wortman said.

The SSA official stated that there is also an automatic exchange of information between the files of his agency and those of 25 states.

But he added that federal agencies are beginning to use the Privacy Act to demand information on individuals. U.S. attorneys, for example, are increasingly obtaining subpoenas to require the SSA to provide them with information contained in its files, Wortman told Moss.

Although privacy regulations have "traditionally prohibited such disclosures," SSA "is experiencing a progressive erosion" of its ability to deny requests from law enforcement officials, Wortman said.

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DEC Opens Retail Store in New Hampshire

(Continued from Page 1)

The store features single-user standalone systems with one terminal that entry-level companies can operate in their normal office environments, Olsen said. Each system will be available with training and other audiovisual aids to familiarize the customer with its capabilities.

Basic Utility Software

The systems will be sold with basic utility software as well as accounting, general ledger, order entry, inventory control, payroll and word processing packages. Users who need specialized applications software will be referred to local systems houses handling DEC equipment, according to Irwin Jacobs, vice-president of the Commercial OEM Group.

The outlet is not aimed at the hobbyist; and no components are available for do-it-yourselfers, Jacobs said.

The shopping center was selected because it is one of the busiest in New England and is close to the DEC plant in Merrimack in case a customer needs more extensive support than can be provided at the store, Jacobs said.

Most customers will be encouraged to make the retail facility their primary point of contact for training and supplies.

However, they will be urged to sign up for maintenance contracts so their systems will be supported with field service, according to Bradley W. Corregan, manager of the store.

First Customer

The first customer to buy a system at the store was Beaver Builders, Inc. of West Newton, Mass. Although the firm handled construction of the DEC store, a DEC spokesman emphasized that Beaver President Saul S. Rudofsky's decision to purchase a Datasystem 310 was based only on seeing the benefits of the small business system.

Corregan said customers who want their systems immediately can drive their station wagons up to the back door for the equipment as soon as their sales slips are written up. In most cases, arrangements will have to be made for the user to return in the evening or another convenient time for training courses on the system, he added.

DEC's New Retail Store

Others Coming

Depending on the success of the first retail outlet, DEC is readying plans to open another store in downtown Boston in the near future, according to an industry source.

For visitors not convinced they need a computer, the store will offer seminars on basic DP concepts, as well as hands-on demonstrations of how business problems are handled.

The store will be open during mall hours and will stock a line of tape cassettes, floppy disks, printer ribbons, print wheels and paper.

OMB Issues Federal DP Security Rules

(Continued from Page 1)

formation fall into this "sensitive" category, OMB noted.

The security of each federal computer installation, whether in-house or provided commercially, must match the sensitivity of the data in the system and the applications run on it, OMB said.

Administrators' Duties

While they have been under development for some time, the guidelines were approved by OMB Director James T. McIntyt Jr. hard on the heels of two General Accounting Office reports criticizing the security of computers and the personal data they contain at the Social Security Administration (SSA) and the Veterans Administration (see related stories on pages 5 and 7).

Under the policy, VA Administration or Max Cleland and acting SSA Commissioner Don Wortman are "responsible for assuring an adequate level of security for all agency data, whether processed in-house or commercially."

Federal department and agency heads must establish the physical, administrative and technical safeguards required to adequately protect personal, proprietary or other sensitive data, OMB stated. In addition, they are responsible for ensuring that "automated decision-making systems" — computer applications that issue checks or requisition supplies, for example, with little human intervention — operate "effectively and accurately."

OMB makes it clear the chief responsibility of these administrators is to initiate and actively support a computer security program within their departments and agencies. DP managers are likely candidates for the actual task of devising and implementing computer security for each federal installation.

Screening of Employers

As a part of each agency's security program, personnel security policies must be developed, OMB said. "The level of screening required by these policies should vary from minimal checks to full background investigations commensurate with the sensitivity of the data to be handled and the risk and magnitude of loss or harm that could be caused by the individual". employee, the guidelines stated.

Contractor as well as government employees must adhere to these agency policies, the directive added.

The agencies must also establish a management control process designed to ensure that the appropriate safeguards are incorporated "into all new computer applications and significant modifications to existing computer applications," OMB said. "This control process should evaluate the sensitivity of each application."

In particular, automated decision-making systems must have defined and approved security specifications before programming is done or changes are made. Before these systems can be used, they must be reviewed for security design and undergo application system tests.

"The results of the design review and system test shall be fully documented and maintained as a part of the official records of the agency," OMB commanded.

Once a system test is completed, an agency official must certify that the system meets federal security policies and standards and that the test demonstrated the application and its data are adequately protected.

There must be an agency program for conducting periodic audits or recertifying the adequacy of security safeguards for each sensitive application, the management and budget agency continued. The directive also gave agencies notice that these audits and evaluations must be conducted by organizations independent of the application's users and the computer facility's manager.

Certifying Requirements

Security considerations are to play an active part in an agency's specifications for acquiring computer facilities, equipment or software. Again, someone in the agency must certify that the security requirements are sufficient for each intended application and that they comply with governmentwide rules.

Agency heads are further responsible for making sure that risk analyses are conducted for each of their computer installations at least once every five years. Intended to provide a measure of an installation's relative vulnerabilities so security resources can be distributed to minimize potential losses, a risk analysis must be performed prior to the approval of design specifications for new computer installations and whenever there is a significant change in the operation.

Finally, every agency security program must include plans for continuing DP support in case normal operations are interrupted. These plans should match the risk and magnitude of loss or harm that could result from disrupting DP support.

Aid to Agencies

The agencies will be aided in their efforts by the Commerce Department, the GSA and the Civil Service Commission. The OMB directive spells out the responsibilities these central agencies are to perform.

OMB expects that, within 60 days, Commerce, GSA and Civil Service will submit plans and an estimate of the resources they will need to carry out this computer security policy. The agencies have been ordered to send their proposals for implementing this policy to OMB within 120 days.

Correction

User experience with DTSS Inc.'s Dartmouth Time-Sharing System [CW, July 31] was incorrectly attributed to Computer Time-Sharing Service (CTSS) of New York. CTSS does use the system, but the experience reported was that of Computer Sharing Service (CSS) of Denver.

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But Urges Risk Assessment

VA's Target System Can Protect Privacy: GAO

By Edith Holmes
CW Washington Bureau

WASHINGTON, D.C. — The Veterans Administration's (VA) Target system, a computerized approach to modernizing benefit claims service to the nation's veterans, *can* protect personal information "*if* [it] is properly designed and implemented," according to the General Accounting Office (GAO).

Made sensitive to the need for privacy protection features by early congressional criticism, the VA used the pilot operation of one part of the system as a tool for developing safeguards, the GAO said in a study recently released here.

Requested by Representatives John E. Moss (D-Calif.) and Charles Rose (D-N.C.), the GAO report added that "VA's efforts to date to establish appropriate safeguards for Target have been piecemeal. [The] VA needs to more thoroughly assess risks of privacy violations in the total Target system environment to provide assurance that it has selected adequate yet cost-effective safeguards to protect personal information."

The GAO found the VA recognizes this need and has plans to perform a risk assessment before Target starts operation. Because the system hasn't yet been implemented, the audit arm of Congress stated it could not make a complete evaluation of Target's ability to protect personal information.

More Sophisticated Reporting

When implemented, Target is expected to provide immediate access to information concerning veterans' claims, status and amount of award checks and other information in the automated master records. Information will be transmitted over communications lines between five computer centers via 2,500 terminals located in VA installations throughout the country.

The VA estimated the system will cost $81.4 million to build and $13.6 million to operate each year.

The VA does not plan to use Target to collect more information on benefit recipients than the current system maintains, but Target's capabilities for reporting on these individuals could be considerably more sophisticated, the GAO report said. "If this capability is reached, the VA may need to tell the public more specifically what information about individuals is being released and to whom," the study recommended.

Wide-Ranging Access

Under the "routine use" clause of the Privacy Act of 1974, the VA already opens its 30 million veterans files to 30 different categories of institutions and individuals other than the veterans themselves. An appendix attached to the GAO report lists and briefly describes these categories.

Among the institutions and individuals regularly perusing VA records are collection agencies conducting credit checks to determine the chances of success in collecting debts owed to the VA; superintendents of state hospitals for the mentally ill, commissioners or heads of state departments and any fee-basis physician or institution treating a VA beneficiary; and "third parties, which may help the VA examine a potential beneficiary's claim for benefits.

Perhaps the most broadly stated "routine use" reads as follows: "The amount of pension, compensation, dependency and imdemnity compensation, educational assistance allowance, retirement pay and subsistance allowance of any beneficiary may be released from this system of records to any person who applies for such information."

Congressional offices, state and federal agencies, educational institutions and courts can see a veteran's record without the specific knowledge of the individual involved. The Privacy Act requires only that federal agencies annually publish in the *Federal Register* a list of the routine uses of particular record systems.

In its study of the VA system, the GAO noted "many of the routine uses in Target are broadly stated and thereby allow [the] VA considerable flexibility in applying them to specific release of information."

Risk Management

The VA's main thrusts to safeguard personal data in the Target system have focused on the use of CRT terminals rather than printers in the VA regional offices and on the need to encrypt data traveling over communications lines. Calling these precautions chiefly computer system network controls, the GAO said data integrity and security in automated systems are not necessarily dependent on such safeguards.

The GAO recommended the VA improve data integrity and security by "prudent use of physical security measures and information management practices." The VA must deveiop a comprehensive risk management program for Target using a mix of computer system network controls together with physical security measures and information management prac-

(Continued on Page 10)

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DOD's DP Seen Harmful to Nation's Security

(Continued from Page 1)

- Monitoring usage and acquisition of the Pentagon's general-purpose administrative computer systems.
- Promoting the interchange of systems, materials and information among DOD computer services.
- Working as the interface between DOD and the Office of Management and Budget (OMB), General Services Administration (GSA) and congressional staffs.
- Assigning DP personnel to projects.

"Computer resources embedded in weapons systems" are not, but should be, subject to the directorate's review, the team pointed out, indicating this has allowed conflicting acquisitions policies to prevail in DOD.

The team's report called for a general "elevation" in rank for DP management within OSD and said overall responsibility for "policy and guidance" on DOD's DP affairs should be vested in either an assistant secretary of defense or a new "special assistant for automation resources" reporting to the deputy secretary.

The report also recommended:

- That private-sector expertise become more accessible to DOD on "key computer issues."
- That the Defense Audit Service's role in reviewing DP budget requests be enhanced.
- That operational control of the DOD Computer Institute be placed within OSD.

The report called the U.S. Air Force (USAF) the armed forces leader in sophisticated use of DP technology. However, it also found that most USAF installations are operating at, or near, capacity "and it is unlikely that they can accommodate wartime surges in load."

Although such noncombat USAF commands as the Air Force Accounting Finance Center feature backup power capabilities, few combat sites do, the report charged, noting the "Air Defense Command, for example, suffers frequent power interruptions because of electrical storm activity in Colorado."

Moreover, the collapse of the USAF Advanced Logistics System "has resulted in open hostility between users and data automation personnel at [the Air Force Logistics Command], distraction at Air Staff levels and the reluctance of civilian officials to support Air Force requests in confrontations with the bureaucracy."

The team found that Army management has pursued DP and telecommunications planning on separate tracks, while the trend at the functional level has been to develop distributed DP and other methodologies that must integrate digital and communications technologies.

"The Army has not clearly established a systems engineering responsibility for development of its automation master plan," the report added. Army wartime capability "is critically dependent on computer-based support systems, yet the Army lacks computer resource redundancy in some of these critical support systems."

The team found that no individual in the Navy "is even cognizant of all computer-related activities and costs" and that it is currently impossible to determine the number of Navy computer systems.

Neither the Army nor the Navy provides formal DP careers paths for officers, the report said, noting that although the Naval Academy offers an excellent education in DP technology, "the Navy cannot wait for graduates with ADP knowledge to reach flag rank."

Positive Findings

However, the report's criticism was not entirely negative. Cited as "commendable" were the Navy's ADP Selection Office, which evaluates DP equipment requests; the Navy's Cobol Compiler Testing Service; its Data Processing Service Center; and the DOD Computer Institute.

"The Marine Corps is an outstanding example of a small but well-managed ADP activity," the report stated. "The Corps has a well-conceived long-range hardware and systems plan, and actions are under way to replace its standard obsolete IBM 360 computers.

"The Marines have central control over virtually all of their ADP resources including the ADP budget, the physical [DP] installations, and the analysts/programmers. This central control extends to both operational systems and for systems under development. The Corps is small and homogeneous, which helps make its task of ADP and telecommunications management easier, but this in no way lessens its achievements," the team said.

The National Security Team is comprised of five members employed in the private and public sectors. The team's report is now being circulated for public review prior to its submission to the OMB and the White House.

IBM Tied to Report Causing Resignation

(Continued from Page 1)

ment services, stated that "Arthur Young is a professional firm and would not be influenced by any outside source."

Maxine Gerhart, director of the New Mexico Department of Finance Administration, also defended Arthur Young as "above reproach." She also said that IBM has been "exceptional" and its support "tremendous."

The issue was a management problem, Gerhart contended, adding a vendor knows its place and a strong manager wouldn't let something like this get out of hand.

Speaking from experience, another former DP director who also resigned from the job stated he saw no such interference and also suggested a director is bound to see more of the mainframe vendor than anyone else.

He also agreed that Arthur Young is too big to put up with any meddling and that it is not characteristic of IBM to conduct business that way either.

Competition the Objective

One of Malnar's main objectives as DP director was to bring more competition into the state's computer equipment procurement. Other vendor's equipment is sophisticated enough to be compatible with the IBM equipment, Malnar said.

But Gerhart contended that other types of computer equipment are in use within the state. Only the central office uses IBM gear; several departments use Univac equipment, she said.

Malnar believes the main problem is that IBM does not understand its role within the state. Too many people try to "run the place," so few decisions are made; when they are made, they experience a special interest-type of pressure, he said.

IBM has even helped develop operating requests for money, which should be the function of the state, Malnar said. IBM has at times written out what it wanted in regard to the budget, even going so far as to list its equipment by model number, he claimed.

However, it is the job of the director to make those decisions and make them in the best interests of the department, not the vendor, he added.

Gerhart admitted that IBM may have been called on for that kind of advice, but attributed it to the turnover of DP directors. Some of those directors were around for such a short time that they had to rely on outside sources for help.

The continuing problems of the department "resulted from different things at different times," Gerhart said. At the beginning the department was unable to keep "quality people" because of the low salaries being paid, but since then the state legislature "has given us everything in the world for support."

The department has had several interim directors, and it has also expeienced upper management problems because of lack of technical understanding, according to observers. Another problem resulted when an earlier DP director resigned after not being allowed to hire his choice for second in command of the department [CW, April 18, 1977].

But Gerhart claimed the department is "on the right track and it should become more stable. I feel better about the place than I have in a long time." The new director, Frank Kleinhenz, formerly an administrator for the city of Albuquerque, has a reputation for being a strong manager.

Gerhart admitted the department had not always "been able to give the kind of service required, but now it will start to keep up with the needs of the state."

Malnar, now a user of the system, claimed, however, that the work seems to be suffering.

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Geller at House Hearings:

Federal Role in Information Policy Critical

By Edith Holmes
CW Washington Bureau

WASHINGTON, D.C. — If the Communications Act of 1978 is to be effective for the rest of this century and beyond, it must come to grips with the federal government's oversight and policy roles in the broader field of information, Henry Geller, Commerce Department Assistant Secretary for Communications and Information, said during recent hearings here.

Addressing Rep. Lionel Van Deerlin's House Communications Subcommittee on H.R. 13015, legislation designed to replace the 1934 Communications Act, Geller warned against "de facto solutions" to information-related problems in the absence of direction from Congress.

The rewrite of the Communications Act of 1934 would take Geller's National Telecommunications and Information Administration (NTIA) out of the Commerce Department and have the agency report directly to the President. The bill also would drop "information" from the present body's title, creating the National Telecommunications Agency (NTA).

Geller and those who served as the directors of the Office of Telecommunications Policy (OTP), NTIA's predecessor, would like to see the "I" put back into NTA. Information policy, they told the House Communications Subcommittee, can't be ignored and must have some focal point.

In its present form, H.R. 13015 "focuses almost exclusively on the policy issues relating to telecommunications," Geller said. The only information issue the bill addresses is privacy, he added.

Similarly, while the proposed legislation could be read to provide for research on information policy issues arising out of the introduction of new communications technologies, NTA's policymaking authority in this field is not discussed, Geller stated.

'Unrealistic Limits'

Because the boundaries between telecommunications policy and policy pertaining to the information carried via telecommunications systems are melding, "it is unrealistic to limit the government's policymaking role to those issues relevant merely to telecommunications technology," the NTIA chief said.

NTA would clearly be a different entity from NTIA and its predecessors because the new agency would have "a greater role in policymaking, particularly in regard to spectrum management," Geller noted. The bill also assigns NTA new responsibilities in telecommunications applications and gives the agency a large mandate to oversee government telecommunications activities, "a mandate that cuts across the programs of all executive branch departments," he said.

But while he sees NTA's authority to develop a National Telecommunications Policy in the bill, Geller misses the agency's ability to implement policy. As is the case with NTIA today, NTA "could merely make recommendations to the Communications Regulatory Commission (CRC) [the Federal Communications Commission's (FCC) replacement] or Congress," he stated.

Geller sought to answer concerns expressed earlier in the hearings by past and present FCC commissioners on the movement of spectrum allocation responsibility from an independent regulatory body to an executive branch agency [CW, July 24]. They fear an executive branch agency would exert a major influence over spectrum assignments, favoring government users over such nongovernment users as the TV networks.

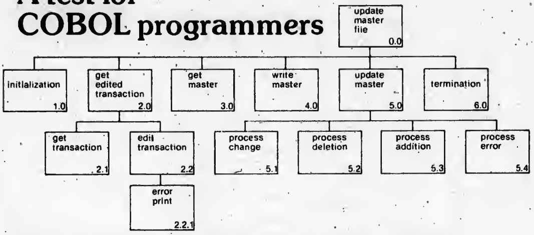
The FCC commissioners and others are particularly worried about the Department of Defense, the largest government spectrum user, encroaching on spectrum allocated to the civilian sector, Geller said.

But NTA, while part of the executive branch, would be independent of all agencies and would be responsible for overall efficient spectrum management. Selection of non-government licensees should be the province of an independent entity, such as the proposed CRC, in Geller's view.

Former OTP head and now with Allison Technical Services, Clay T. Whitehead suggested that the House Communications Subcommittee give NTA some of the responsibilities for computer standards, privacy and procurement that are now vested in the National Bureau of Standards, the Office of Management and Budget and the General Services Administration.

(Continued on Page 10)

A test for COBOL programmers



What's wrong with this hierarchy chart?

Many things. The numbering system is inefficient (2.0, 2.1, 2.2.1, etc.). Modules 1.0 and 6.0 aren't functional (they are carryovers from unstructured thinking). The module names are inconsistent and imprecise (what's the difference between "error print" and "process error"?). But these are the least of the problems.

What's really wrong with this chart is you can't code a decent COBOL program from it. Why? Because the modules don't have the proper relationships to each other. In particular, modules 2.0, 3.0, and 4.0 should be subordinate to module 5.0. Then, module 0.0 can perform module 5.0 until all records are processed. And module 5.0 can get transactions, get masters, and write masters whenever needed.

Oh sure, there are ways you could make this chart work. You could code a two-paragraph section for module 0.0 and have the first paragraph perform the second one until all records are processed. Or, you could make modules 2.0, 3.0, and 4.0 subordinate to both module 0.0 and 5.0. Either way, though, you end up with a sloppy programming product . . . and you defeat the principles of structured design and structured programming

Oddly enough, this chart was made up from examples taken from leading books and courses on structured design. In other words, everything that is wrong with this chart is presented as right by one educator or another. So it's little wonder to me that structured design and structured programming have a long-way to go before they live up to their promise.

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A better method of design

If you'd like to learn a better way to develop hierarchy (or structure) charts, I'd like to recommend a couple of books to you. They are written by Paul Noll, a software specialist and trainer for a large company in San Francisco. He is one of the leading COBOL experts in the country, and he has some unique ideas about structured design. His books are written specifically for the experienced COBOL programmer.

In the first book, *Structured Programming for the COBOL Programmer*, Paul shows you how to create a structure chart that will be an efficient guide to your COBOL coding. You'll learn the four steps for creating structure charts . . what modules should go at what level. . . how to create functional module names that tie in to the paragraph names of the COBOL program. . .how to number the modules so the numbers can become part of the COBOL paragraph names. . .the six things to watch for when reviewing a structure chart . . and much more. As a bonus, this book also covers structured coding, top-down testing, and structured walkthroughs .

so you can see how the effectiveness of these techniques depends upon the strength of the structure chart.

The second book, *The Structured Programming Cookbook*, is a tool kit for the development of structured COBOL programs. It gives standards and guidelines for program development so it becomes an instant standards manual for a structured COBOL shop. And it gives complete design, documentation, and code for four different types of business programs. As a result, this book can have a major effect on programmer productivity because it helps stop program re-invention.

If you are already using structured design and structured programming, I'm convinced that Paul's books will help you to improve your methods and your results. On the other hand, if you haven't yet been introduced to these productivity techniques, you've got some exciting reading ahead of you. I think you'll find that these are the only books you will ever need if you decide to implement the new techniques in your shop

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Mich. Project May Release Police Data on Subversives

By Tim Scannell
CW Staff

LANSING, Mich. — Information collected by state police here on nearly 38,000 Michigan residents will be released to those individuals later this year if the legislature, scheduled to convene Sept. 5, can be convinced to allocate funds for the project.

The information, focusing on subversives and subversive activities, is contained in files compiled between 1950 and 1976 by the State Police Special Investigative "Red Squad."

The proposed project would attempt to match the names and addresses in the files with those contained in computerized drivers' license and motor vehicle files at the Secretary of State's office. The reason for this, according to Assistant Attorney General George Weller, an attorney handling the case for the state, is to update the addresses in the State Police files, "some of which are more than 20 years old."

The information in the Red Squad files is contained on microfilm and will have to be transferred to magnetic tape before being input to a Burroughs Corp. B6700 at the secretary's office, Weller observed. "That tape will then be run through the computer containing driver's license information and if there is a positive match, the current address will be substituted for the old one." If no match occurs, Weller added, then the person's old address will remain in the file.

The individuals will be notified by mail of the availability of the files and informed that they are entitled to receive copies of the information concerning them. In addition, several newspaper advertisements will be placed stating that persons who think they are in the files may ask the State Police to check for their names, Weller said.

The Red Squad was established in 1950, Weller explained, and authorized by law to collect and maintain data on alleged subversives. The State Police, he continued, gathered information up until 1976 when, under pressure from various political groups, the laws were declared unconstitutional by two Michigan courts.

Most of the data in the files wasn't used, Weller declared, but an official with the Michigan State Police contends the information was, at times, extremely helpful. "When the Secret Service was protecting a President or a Presidential candidate who came into Michigan, these files were queried to determine if any persons had made threats against his life," Capt. Roger Warner, commanding officer of the Criminal Investigation Section at East Lansing, pointed out. "That information was then made known to the Secret Service."

Warner also noted that the files were used to clear people who were seeking public employment in critical-type jobs, such as in law enforcement. They were also accessed during the "war years" to investigate people who were being placed in defense plants or other areas where they might have access to government-sensitive material, he said.

Broader Policy Role Urged

(Continued from Page 9)

"It would also be desirable to transfer most of the National Aeronautics and Space Administration's communications research to NTA," Whitehead said.

Furthermore, NTA's role in the national communication system affecting the national security should be strengthened, he contended.

The director of the new agency "should be given explicit authority to develop a program of telecommunications standards that encourages maximum flexibility in the use and interconnection of systems," Whitehead stated.

The role of NTA and that of OMB need to be clarified. These agencies should not compete with each other for "procedural primacy on budget or organizational matters," he added.

Whitehead suggested that NTA be established as soon as possible, "perhaps before H.R. 13015 is passed," but Van Deerlin, who cosponsored the bill with Rep. Louis Frey (R-Fla.), believes only a comprehensive approach to the communications problems facing the U.S. will do.

With two years under his belt as acting director of OTP, John Eger, an attorney with Lamb, Eastman and Keats, urged the subcommittee to consider information policy issues and applauded the bill's assignment of the development of U.S. positions in international communications arenas to NTA.

"OTP never really worked as a forum for debate on telecommunications issues because the White House is a political institution first, second and third," Eger said. "NTIA doesn't have the strong mandate OTP did, even though it is a step away from the White House.

"NTA is the best of all worlds. It's a step away from the White House, but has more clout than even OTP wielded," he added.

Target Can Protect Privacy

(Continued from Page 7)

tices, the report said.

Before the GAO audit, the VA's Office of Inspector General had not planned to participate in the risk assessment, the GAO reported. The GAO called the Inspector General's participation "essential," however, "because Target is a payment system from which billions of dollars are disbursed annually and the risk assessment should analyze risks not only to personal data, but to financial data as well."

Since Target is still in the development stage, participation by the Inspector General and his office can help ensure that adequate controls are established in the system design so costly changes will be avoided after the system is operational, the GAO pointed out.

Causes Emergency Disbursements

Compiler Bug Proves Costly for N.H. Welfare

By Marguerite Zientara
CW Staff

CONCORD, N.H. — A compiler malfunction in New Hampshire's recently implemented centralized welfare Eligibility Management Information System (Emis) has cost local welfare offices in every town, city and county in this state up to $3,000 each in emergency welfare payments — and a lot of grief besides.

Emis is a single-form eligibility determination program for such federal programs as Aid to Families With Dependent Children (AFDC), Medicaid, food stamps, Social Services Title 20 and State Supplemental Programs such as Aid to the Needy Blind, Aid to the Disabled and Old Age Assistance, according to Richard Lacombe, state welfare director.

The centralized system went on-line throughout the state on May 1 after a month-long test period in one district office, and the trouble for the city, town and county welfare offices began soon after that, according to Lacombe.

Although brought in to increase efficiency and speed service, the system's software has increased the waiting period for food stamps, for example, from 15 days to 25 days, Lacombe said. "But that is still under the 30-day maximum legal limit for food stamps," he noted.

The local welfare offices, however, found it hard to appreciate the fact that the system was operating within legal limits since a state statute requires them to provide monetary and food stamp assistance to their clients when delays occur in the state's welfare system.

When delivery of the Authority to Purchase (ATP) food stamp forms was delayed in May, residents started applying to their local offices for relief. I've been trying to figure out where all these people have been coming from," Patricia Kelley, Concord, N.H., welfare director, said.

While many city, town and county welfare offices received applications for aid during May, the real trouble hit at the end of June, according to Richard Burrows, management system administrator.

From June 22 to June 28, nothing was processed by the system. Although the major food stamp run for July had already been done and the July 1 checks mailed, there are "pick-up runs" made every three working days which could not be processed, Burrows said, because the system was down.

Pick-up runs are those that take care of eligible applicants who apply after the major run has already been made. They are what makes Emis a "responsive system," according to Lacombe.

"The ATPs from the first pick-up run should have gone out on July 1 and we mailed them out on July 3. Because of the July 4 holiday, they didn't arrive until July 6 in most cases," Burrows said.

Bug in Software Update

The problem stemmed from a new software release from Honeywell Information Systems, Inc., which furnished the hardware for the system, according to Burrows.

"There was a bug in the compiler under the new release of the operating system, so when we tried to compile the programs that we could compile previously we'd get a different result," he explained. "We spent a lot of time looking for the problem within the logic of the system, until we discovered finally that the problem was in the compiler."

Since the problem was fixed, daily runs have been completed "without any problems," he added.

While most of the processing problems seem to have been solved, it is not clear whether the state can legally reimburse the local offices for the sums they have paid out in emergency relief assistance.

Kelley said Concord has paid out "around $1,200 because of state errors and delays." She said the problems have abated since May and June, but she "objects strenuously" to Concord's supporting families on food stamps for three to four weeks while they wait for the state system to process their applications.

John Crisman, Nashua welfare director, estimated Nashua is $2,000 to $3,000 in the red as a result, and "the state has really saved itself a chunk of money."

System Defended

Lacombe, however, sees things a bit differently. "We do not feel, for instance, that there are large numbers of people who are not receiving assistance because of the computer system," he said.

"We think that from a system standpoint — given the size of this one and its tremendous complexity — that it's gone very smoothly. We have met our payroll deadlines, people are getting checks, food stamps are getting out," Lacombe said.

Emis runs on dual HIS Model 6060 CPUs with 256K of memory each. Forty-four Hazeltine, Inc. Modular 1 CRT terminals are installed in 17 district offices throughout the state and in the central state office.

Emis was developed by Delphi Associates, Inc. of Burlington, Mass.

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MONTREAL — Issues in U.S.-Canadian transborder data flow will be examined at a one-day conference here Sept. 6.

Discussion will focus on emerging trends in the movement of computer data between the two countries; the impact of such trends on the DP industries in both nations; and the role of government policy in shaping those trends.

Speakers will include Morris Crawford of the U.S. State Department; W.E. Cundiff, Institute for Research on Public Policy; J.C. Grant, Royal Bank of Canada in Montreal; and John Eger, a private attorney and formerly head of the White House Office of Telecommunications Policy.

The conference, to be held at the Four Seasons Hotel here, is being sponsored by the Institute for Research on Public Policy. Registration is $45.

Additional information is available from Cundiff or from Mado Reid at the institute, Suite 514, 335 Queen Mary Road, Montreal P.Q. H3V1H8, Canada.

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Sept.5-7, London — **International Symposium on Optical Computing,** sponsored by the Institute of Electrical and Electronics Engineers (IEEE). Contact: Sam Horvitz, P.O. Box 274, Waterford, Conn. 06385.

Sept. 5-8, Washington, D.C. — **Compcon Fall '78,** sponsored by IEEE Computer Society. Contact: IEEE Computer Society, P.O. Box 639, Silver Spring, Md. 20901.

Sept.5-8, Tokyo — **Info/-Asia,** sponsored by Clapp & Poliak, Inc. Contact: Clapp & Poliak, 245 Park Ave., New York, N.Y. 10017.

Sept. 6, Newton, Mass. — **Invitational Computer Conference,** sponsored by B.J. Johnson & Associates. Contact: B.J. Johnson & Associates, Suite 203, 2503 Eastbluff Drive, Newport Beach, Calif. 92660.

Sept. 6-8, New York — **Improving Managerial Skills of the New or Prospective Manager,** sponsored by American Management Associations (AMA). Contact: AMA, 135 W. 50th St., New York, N.Y. 10020.

Sept.11-12, Palo Alto, Calif. — **Design to Cost/Life Cycle Cost,** sponsored by the American Institute of Aeronautics and Astronautics (AIAA), Society of Logistic Engineers and Technical Marketing Society of America. Contact: AIAA Conference Registrations, P.O. Box 91295, Los Angeles, Calif. 90009.

Sept.11-13, Cherry Hill, N.J. — **Data Entry Management and Supervision Seminar,** sponsored by Management Information Corp. (MIC). Contact: MIC, 140 Barclay Center, Cherry Hill, N.J. 08034.

Sept. 11-15, Jackson Hole, Wyo. — **How to Develop an Effective Long-Range Data Processing Plan,** sponsored by Keston Associates. Contact: Keston Associates, 11317 Old Club Road, Rockville, Md. 20852.

Sept. 12-14, Hartford, Conn. — **How to Develop DP Systems for General Ledger and Financial Statements,** sponsored by the Hartford Graduate Center. Contact: Hartford Graduate Center, 275 Windsor St., Hartford, Conn. 06120.

Sept.12-14, Los Angeles — **Western Electronic Show and Convention (Wescon '78).** Contact: Wescon '78, 999 N. Sepulveda Blvd., El Segundo, Calif. 90245

Sept.12-14, Chicago — **Developing DP Standards Workshop,** sponsored by Management Dimensions, Inc. Contact: Carole Flackoy, 1754 E. Morada Place, Altadena, Calif. 91001.

Sept. 13-15, West Berlin, Germany — **Fourth International Conference on Very Large Data Bases,** sponsored by IEEE Computer Society. Contact: A. Wasserman, Medical Information Science, University of California, San Francisco, Calif. 94143.

Sept.14-15, Washington, D.C. — **Conference on Logistics Issues,** sponsored by the Los Angeles section of the American Institute of Aeronautics and Astronautics (AIAA). Contact: AIAA Conferences, P.O. Box 91295, Los Angeles, Calif. 90009

Sept. 17-21, Chicago — **45th Annual Credit Management Conference,** sponsored by National Retail Merchants Association (NRMA). Contact: Credit Management Division, NRMA, 100 W. 31st St., New York, N.Y. 10001.

Sept. 17-21, Orlando, Fla. — **Meeting of Data Catalogue 2 Users,** sponsored by Synergetics Corp. Contact: Alexander R. DeVito, President, Synergetics, One DeAngelo Drive, Bedford, Mass. 01730.

Sept. 18-19, San Francisco — **Seminar on the Use of Computers in Geo-Coded Data Bases,** sponsored by Comarc Design Systems. Contact: Donald R. Johnston, Vice-President, Comarc Design Systems, 315 Bay St., San Francisco, Calif. 94133.

Sept. 18-20, Boston — **Developing Computer-Based Payroll Systems,** sponsored by American Management Associations (AMA). Contact: AMA 135 W. 50th St., New York, N.Y. 10020.

Sept. 18-20, Boston — **Microfilm Records Management,** sponsored by American Management Associations (AMA). Contact: AMA, 135 W. 50th St., New York, N.Y. 10020.

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Sept. 18-20, Toronto — **APL Users Meeting,** sponsored by I.P. Sharp Associates, Ltd. Contact: Rosanne Wild, Conference Coordinator, I.P. Sharp Associates, 145 King St. West, Toronto, Ont. M5H 1J8, Canada.

Sept. 18-22, Chicago — **Structured Design and Programming Workshop,** sponsored by Brandon Systems Institute. Contact: Brandon Systems Institute, 4720 Montgomery Lane, Bethesda, Md. 20014.

Sept. 18-22, Vail, Colo. — **Personnel Productivity in Data Processing,** sponsored by Keston Associates. Contact: Keston Associates, 11317 Old Club Road, Rockville, Md. 20852.

Sept. 18-22, Paris — **Convention Informatique.** Contact: Convention Informatique, 6 Place de Valois, 75001, Paris, France.

Sept. 21-22, Palo Alto, Calif. — **Seminar on Source Selection Techniques,** sponsored by the Technical Marketing Society of America (TMSA). Contact: TMSA Conferences, 5959 W. Century Blvd., Suite 1010, P.O. Box 91295, Los Angeles, Calif. 90009.

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Matches Cargoes and Carriers

Net Helps Rid Truckers of That Empty Feeling

By Tim Scannell
CW Staff

WASHINGTON, D.C. — Rising fuel costs and spiraling operational expenses have led some members of the trucking industry to adopt a centralized, computer-based cargo-routing system that helps reduce the number of backhauls — vehicles returning empty.

According to industry estimates, 5% to 7% of the regulated common carriers or trucks in the U.S. travel empty at one time or another. Eliminating these backhauls is a good way to save both money and fuel, according to Wendell Shanks, manager of the Computerized Interchange Substituted Service (Ciss).

Implemented in early March through the joint efforts of the American Trucking Association and the Regular Common Carrier Conference, Ciss is used to match various commodities and shipments nationwide with trucks traveling to each load's destination, Shanks explained.

Levels, Peaks, Valleys

The system is basically an on-line data base which currently serves all of the major and even some of the minor cities throughout the continental U.S. For instance, if a firm in St. Louis has a load going to Chicago but doesn't have a truck to pull it, that company could dial up the data base in Washington via a terminal to post the availability of the cargo.

"Part of the entry process of posting a load is specifying the destination, source, the type of trailer needed and the time the items have to be at a particular city," Shanks said. "Other firms, if interested, would then be able to claim that load."

The system can also be used by trucking firms when the amount of their business exceeds the number of vehicles that company has at its disposal, Shanks continued.

"There are peaks and valleys in the business, of course, and this helps level it out," Shanks observed.

Dial-Up Network

Ciss operates through a Digital Equipment Corp. Decsystem-10 with 512K words of main memory. The data on available trucks and cargoes is stored on three disk drives that have a combined capacity of up to 600M characters.

"Each carrier uses its own terminal," Shanks stated, "whether it already has one that might be compatible or it has to rent one." Users call into the system via telephone lines through the Tymnet remote computing network.

Carriers are assigned jobs on a "first-come, first-served basis," Shanks said, and are presently charged a flat rate of 30 cent/min. "We normally find that a user accesses the system for about 10 to 15 minutes a day," he said.

The idea for establishing a centralized base of information for truckers was initiated by a group of carriers in the central Midwest region of the U.S. who were manually matching trucks and loads for about five years. A driver "would call a central person on the telephone and say, 'I've got such and such a load going here,' and maybe someone else would call later with an empty truck going to that destination, and they'd get together," Shanks said.

The computerized system is basically the same, except that most of the "manual interaction" has been eliminated. "There's only a need for manual intervention in very special cases," he noted.

These unique cases usually consist of transporting such "special-type commodities" as explosives, liquor and other risky or valuable items. "Some people just don't want to haul that type of stuff," Shanks remarked.

The system was designed to "flag" these items so the person wanting to claim the load "would have to physically call the company for more detailed information."

Naturally, Shanks commented, since most of what a truck carries and its destination is privileged information, the system has a certain amount of "inbred" security: "DEC's software system is built to be purely a time-sharing system, complete with passwords, project number sequences and other things present in normal systems security.

"Above that," he noted, each individual carrier has its own account number."

Further, "users are restricted because they don't use any of our resources other than what they're using for the system itself."

How much is saved in fuel, money and time is difficult to pinpoint, Shanks said, because the figures are directly proportionate to the number of people using the system. However, he did say one company saved more than $7,000 during the month of April, when the program only had six participants.

"The cost of the system to a particular carrier is minimal; in fact, by claiming or having one load claimed within a given month, a company can more than cover the cost of using the system for that month," Shanks said.

The program currently has 28 participating trucking companies and plans to include adding 15 to 20 more in the near future.

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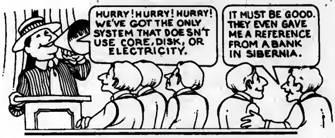
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Lasers, Mini to Guide Six-Mirror Telescope

By Tim Scannell
CW Staff

MOUNT HOPKINS, Ariz. — Construction of a revolutionary six-mirrored telescope which uses lasers to maintain reflective alignment and a computer to process its celestial observations is nearing completion here.

The Multiple Mirror Telescope (MMT), built jointly by the University of Arizona in Tucson, Ariz., and the Smithsonian Astrophysical Observatory in Cambridge, Mass., weighs a total of 500 tons and is located atop the 8,550-foot summit of Mount Hopkins.

The device, when operational, will be the third largest optical and the largest infrared astronomical instrument in existence, according to Dr. Herbert Gursky, associate director for optical and infrared astronomy at the observatory.

The only instruments that surpass the MMT in light-gathering power are the 200-inch reflector telescope on Mount Palomar in California and a six-meter (236-inch) telescope in the Soviet Union.

The MMT actually consists of six 72-inch telescopes mounted symmetrically around a central axis in "six-gun fashion," with the optical beams brought to a single focus by a special six-sided collector mirror. "In order for the system to work," Gursky explained, "all parts of the telescope must be 'phased together.' In other words, the light must arrive from all parts of the telescope at about the same time and within a few wavelengths of each other."

Model of MMT

Corrections Calculated

A Data General Corp. Nova 800 minicomputer with 32K of memory calculates the divergence of light paths leading to each of the mirrors and generates the appropriate signal to make the necessary corrections, Gursky explained. "The computer is used as a feedback element in a rather conventional control application. In other words, it's used to do all the 'dirty work.' "

As a strictly defined telescope or scientific instrument, the MMT is not very different, operationally, from conventional single-mirror devices. The only real difference is that the field of view, or angular piece of the sky the MMT looks at, is much smaller than that of traditional, large-mirrored telescopes, Gursky stated. "This essentially means that photographic survey work, where you have to take a picture of a large piece of the sky, is impossible for the MMT."

However, Gursky pointed out, the number of people who actually do photographic surveys of large areas is relatively small. "If the need for that sort of work arises, we will simply apply for time at other observatories."

MMT Very Different

Technically, the MMT is very different from its counterparts, Gursky continued. As an astronomer moves the telescope around in the sky and as the night progresses, certain environmental factors change. "The gravity loading changes because you're moving the mirror around in the gravitational field and the temperature changes in the night air, he said. "All these things tend to distort the structure of the mirror.

"In a single mirror, you have no other choice except to try to make the surface very stiff. But, by using six separate mirrors, it's possible to control each one individually so that as these slow changes occur, you can compensate for them," Gursky said.

Laser Determines Tilt

A single laser beam, split six different ways, is used to measure the amount of tilt needed in each mirror to compensate for surface distortion. The splintered beam follows the same light path as the star and the slightest deviation is detected by a series of photodiodes that signal the computer if a change occurs, Gursky stated. "The computer then generates a correction command for the mirrors to bring everything back to alignment."

The computer is also used to counter-rotate the building itself to compensate for the natural rotation of the earth. The MMT is housed in a rectangular four-story structure rather than in a conventional astronomical dome, Gursky said. The building rotates via four 36-inch-diameter steel wheels on a flat steel track and is capable of turning 270 degrees in either direction at a maximum speed of 90 degrees per minute.

Actual Position Measured

In tracking the movement of a particular star or planet, the computer "measures the actual position of the mount that's recorded on the telescope, then calculates where the mount should be" in relation to the body being observed, Gursky said. "When we want to move from one position to another, we simply tell the computer where it is we want to go. The minicomputer then calculates all of the appropriate angular displacements . . . and sends the information out to the electromechanical driving system."

The computer is also used by the scientists in an interactive mode to analyze data as it comes in from the telescope and to supply preliminary results. "We can look at the data immediately and have the computer signal us when we have collected enough data to meet our experimental objectives," Gursky said.

(Continued on Page 15)

Austria Ready to Enact Data Protection Law

VIENNA, Austria — The key parliamentary committee which has been studying a proposed Data Protection Act here for many months has approved a final draft that will be enacted by the full parliament in October, according to *Transnational Data Report (TDR)*. The Austrian data protection act will become effective next July 1, TDR said.

The act contains features similar to those of other European statutes including a data inspection board (DIB) of four to six members with powers of a court over the maintenance of "automatically processed personal records.". Also provided for are a registration and licensing scheme as well as the right of individuals to inspect and correct their files. Legal persons or companies come under the scope of the law, TDR said.

Austrians have taken data protection seriously within the government and through representatives at international bodies. The issue is deemed so important that "because information power is an important dimension of state power, the data inspection authority should be independent of the government, having a status equal to the highest administrative court," according to the draft.

A Special Right

The act will also contain references to the constitution so the right to privacy will receive a special right rather than being protected under clauses relating to personal freedoms.

Data transmitted abroad will be subject to permission by the DIB, but permits will be waived if the country to which it is transmitted has a data protection law in force similar to Austria's, agreements exist affording protection under public international law and the data is transmitted by the data subject.

Even when permission is required, it will be given unless there are grounds to believe that transmission will threaten the privacy of individuals involved and a general rule of "public welfare" may be compromised.

Austrian enterprises may transfer personal data abroad to their affiliates when appropriate security measures are provided.

These rules will also apply when foreign data banks are accessed from Austria, TDR noted.

TDR is published quarterly by The Wayne Smith Co., Suite 810, 500 12th St. S.W., Washington, D.C. 20024.

Lasers, Mini Run Telescope

(Continued from Page 14)

"Our use of computers will expand substantially in the future," Gursky explained. "We're rapidly approaching the point where everything we do will be totally computerized. The new instruments we're building are all computerized and as rapidly as we can, we are computerizing the old ones."

However, many of the instruments used by astronomers can't incorporate general-purpose computers because they do not function quickly enough. Many of the decisions have to be made on a microsecond or sub-microsecond level, Gursky stated, "and presently that could only be accomplished by special-purpose digital electronics.

"In some cases, we can't really use the computer as much more than a buffer — to get the information onto a magnetic tape or onto a disk," Gursky explained.

Switch Planned

The MMT installation is currently using a Digital Equipment Corp. floppy disk drive to collect data but eventually will convert to hard disk. "As people accumulate more and more programs, it will be much more convenient to have a single disk on which all of the information is stored,". Gursky continued. A large, single disk, he said, is more desirable than having people "search through a lot of floppies to dig the right program out."

Critics of the system have claimed the telescope's design relies too heavily on new and untried techniques, but Gursky disagrees with their opinions. "I've always been annoyed at the reaction that some astronomers have toward this development," he said. "Everything we've done so far has been done before by rather traditional engineering techniques.

"There is a long history of people building segmented mirrors of various types. What's new here is the recognition that because of lasers and computers and things, we now have active control — which reduces the tolerance restrictions of the overall structure," he said.

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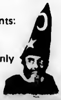

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CPM Helps Power Company Monitor Its Jobs

By Marguerite Zientara
CW Staff

WILMINGTON, Del.— A computerized project management tool has been "indirectly responsible" for getting many of Delmarva Power & Light Co.'s largest jobs done on time, according to O. Lloyd Shorter, manager of general services.

The Capital Project Management System, created by MDC Systems of Philadelphia, has enabled Delmarva Power to monitor and coordinate more than 60 projects for the construction of power-generating plants, substations and transmission lines.

The system produces various management and project engineering reports for Delmarva, which spends millions of dollars each year on construction projects, according to Kent Williams, who worked on the acquisition of the system about five years ago.

> *'If you don't have some tool to know where you are and be able to project your cash forecast, keep track of your schedules and know where your holdups are, then you have no way of managing a large number of projects,' Williams said.*

"If you don't have some tool to know where you are and be able to project your cash forecast, keep track of your schedules and know where your holdups are, then you have no way of managing a large number of projects," Williams pointed out.

For Delmarva, the system produces a full report on each project detailing every activity involved in it. For the construction of a new power substation, for example, a critical path method (CPM) diagram may be generated two years before the project is active — allowing the company to order transformers, circuit breakers and other major items of equipment with long lead times from the manufacturers.

The project management group establishes the CPM diagram with limit dates and time periods allowable for the various parts of a project. A project like a new power substation would include such tasks as land acquisition, purchase of materials, installation of foundations and installation of power line poles.

About once a month, or whenever a major activity takes place on a job, the project engineer consults the project control people to ascertain the status of the project. The project engineer updates the data for the system, and a management report then indicates whether a specific target date can be met and, if not, gives the reasons why.

The system also generates management reports listing all projects on schedule and behind schedule and has a "look-ahead" option listing all projects that will become active within either the next 30 days or the next 100 days.

A capability of the system that Delmarva is just beginning to utilize is resource allocation in the areas of manpower and cash flow analysis, Shorter said. As Williams noted, "The effect of improper financing at the wrong time could cost you a bunch of money."

Moratorium on Use

Although the system was installed five years ago, Delmarva reverted to a manual scheduling system for almost a year from 1977 until early 1978 — because company personnel "didn't know how to use a scheduling system," Shorter said.

After the employees learned the basic theory of project scheduling, Delmarva reinstated the computerized system and "now it seems to be a pretty good program for us — it has the advantages we need," he said.

Leases Time

Delmarva leases time on a local bank's IBM 3031 processor to run the program. A Delmarva spokesman said he could not divulge other specifications of the system because of the bank's security requirements.

He did say, however, that the 3031 represented an upgrade from an IBM 370/155 with 2M bytes of storage a year ago.

Since the bank is going to 24-hour banking, Shorter said, there is less memory space available there and Delmarva is considering going to a service bureau for computer services.

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National DP Study to Analyze Raindrops Falling on Your Head

By Ann Dooley
CW Staff

ORONO, Maine — There may be more to a raindrop than most people think. Besides water, it could carry a wide range of various pollutants to earth that may have a significant effect on the people upon whom it falls.

Just what those particles are — in both dry and wet rain — is the subject of a research project going on here at the University of Maine.

The work being done here is part of a larger national project in which land areas as well as bodies of water will be examined to determine whether elements such as zinc and lead have fallen in amounts sufficient to affect the reproduction of fish and other food chains, according to Stephen Norton, an associate professor of geological sciences.

Rain Data Base

Each one of 50 regional project centers like this one will collect information in their own areas to establish a data base that will help reveal the environmental impact of precipitation. Once that data base has been established, it may be possible to predict what will happen in the future and lead to better environmental planning, according to Norton.

The project, which is expected to take five years, is just beginning to produce data. However, once enough data is gathered, researchers will send the information to the Natural Resources Ecology Laboratory at the University of Colorado, where it will be maintained in a Control Data Corp. Cyber 171 system with 300K of memory.

Figures on the amounts of monthly dry fall and weekly rainfall and the spatial variation between the stations will be collected. Samples of precipitation will be tested at each station and information about its contents will be sent to the main site to be processed.

The principal types of information entered into the system include element deposits over a period of time, the distribution of rainfall, a listing of base information and any outstanding or significant amounts of pollutants.

Actual weather information will also be stored in the computer system.

Two kinds of computer-drawn maps will be used by the researchers. One will show the contours formed by a specific particle in a raindrop as it varies because of factors such as industry or rainfall, and the second will show how much of the constituent particle falls over an area per unit of time.

All the information obtained will be analyzed for 30 constituents such as alkalinity, sodium, calcium, nitrogen and sulfuric acid, Norton said.

The rain composition project is the first of its kind undertaken in this country. Europe has had a widespread program for collecting precipitation data for years, so there's a lot of catching up to do, Norton said.

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What's Being Measured?

Users Warned About Use Fees for Peripherals

By Brad Schultz
CW Staff

WINTER PARK, Fla. — Users who rent computer peripherals risk being overcharged if the rental fee is assessed in proportion to CPU rather than peripheral activity, according to a recent issue of *CNReport*.

The CPU may run when peripherals do not, the report noted, and CPU usage may exceed peripheral usage within a given timeframe. If peripherals do not feature separate usage meters, renters will be overcharged when peripheral activity falls short of CPU activity.

However, users will be undercharged if peripheral operation exceeds that of the CPU, *CNReport* Vol. 2, Issue 3 added.

"The user should recognize this potential problem and determine whether, on the basis of its operations, separate usage meters should be installed," the report said.

For some users, the expense of separate meters will not be sufficiently offset by savings in rent to justify such an acquisition. Others may discover overcharging and undercharging balance out, indicating usage assessment based on CPU activity is fair for vendor and user alike.

Yet a number of users could achieve significant savings if they installed usage meters on some types of rented hardware, the report concluded.

Some rental agreements preclude transition to usage measurement that is not based on CPU operation, and the vendor may refuse to remove such a constraint. In such cases, *CNReport* advised the user to cancel or threaten to cancel the agreement to get the vendor's cooperation.

The report added that any user about to sign a peripheral rental agreement should attempt to have the agreement allow peripheral activity to be the basis for rent assessment.

CNReport is published monthly by International Computer Negotiations, Inc., 1331 Palmetto Ave., Winter Park, Fla. 32789.

Program to Certify Auditors Has Exam, Conduct Code

DEARBORN, Mich. — A certification program requiring a DP auditor to satisfy minimum levels of education, training and work experience to become a Certified Data Processing Auditor (CDPA) has been announced by the EDP Auditors Foundation for Education and Research.

The program will be implemented in two phases. Under Phase I, which began July 1, a qualified applicant must satisfy an experience requirement and accept the foundation's Code of Professional Conduct.

Phase II

Phase II, effective July 1, 1979, stipulates that a CDPA certificate will be granted only upon successfully completing an examination, satisfying both the educational and experience requirements and accepting the Code of Professional Conduct, the spokesman stated.

Applications for the Professional Experience Provision, under Phase I, must be submitted prior to June 30, 1979, the spokesman noted, adding all holders of the CDPA certificate will be obligated to satisfy continuing education requirements.

Additional information and CDPA applications can be obtained from the Director of Certification, EDP Auditors Foundation, Administrative Office, 7016 Edgebrook Lane, Hanover Park, Ill. 60103.

Survey Covers Courses Offered In Production

WASHINGTON, D.C. — More than 450 North American colleges and universities offer courses and seminars relating to production and inventory control, according to a recent American Production and Inventory Control Society, Inc. (Apics) survey.

The survey, the first of its kind, was developed to help members and others who are interested in locating colleges and universities that offer course-related material in the field, according to Al Perreault, vice-president of education and research.

Each educational institution was asked to list courses, workshops and seminars offered under the major headings of forecasting, capacity planning and control, inventory planning management, material requirements planning and operations scheduling and control.

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DP Helps Volleyball Coach Optimize Strategy

By Tim Scannell
CW Staff

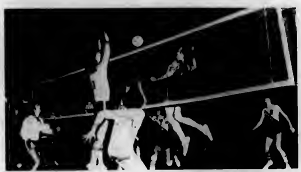
LIMONI, Iowa — Some collegiate teams excel on the playing field to preserve the honor and glory of their alma mater. Still others strive to do their best in remembrance of the mythical "gipper." However, a volleyball team here at Graceland College plays for and is motivated by a computer that monitors and evaluates each team member's performance.

"Through the analysis we do here at Graceland . . . I know exactly what our best defense alignment is and who our blockers and backcourt players should be," coach Rod Schall explained. The computer is used to "remember all of the thousands of judgments made during each game . . . and has allowed us to play the best players in their best positions," he continued.

Schall and his system rate each volleyball player on a scale from zero to five. "If a player executes a move perfectly, he gets a five," Schall said, "and if he blows it completely, he gets a zero." The person is given either a one, two, three or four "depending on how effective the play was."

Each player's moves or executions are divided into six basic skills which include the serve, pass, dig (a defensive play), set, spike and block. "In addition to this," Schall pointed out, "I subdivide some of these skills according to a player's position on the court — left, middle or right — " and the height of the ball as it travels through the air.

Each score has a specific definition, Schall noted, so the players' ratings are actually quite objective even though they seem to be based on subjective judgments. "In other words, a person will get a four if the play is aggressive enough to prevent the other team from running an offense." On the other hand, if a player is rated a one, it usually means the opposite — that a play resulted in the other team's running a multiple offense against Graceland, he said.



Graceland College player prepares to spike during game with Western Illinois University.

Switch From Calculator

Schall began recording performance statistics for his team several years ago using an electronic pocket calculator to compile and process the data after each game. Eventually, he decided to use the school's Hewlett-Packard Co. 3000 and the machine's 164K memory. Since the school's computer isn't portable, a trained statistician evaluates each player during a game and dictates his information into a tape recorder. The information is then tallied and fed into the computer via one of 16 terminals "a day or so later," Schall said, to aid in postgame analyses.

The hard facts served out by the computer are occasionally garnished with some degree of emotionalism and intuitive feeling, Schall admited, but not often. "In 1973, the year we won the National Association of Intercollegiate Athletics (NAIA) volleyball championships, I didn't use the top six players in my starting lineup," he recalled.

Instead, Schall chose to begin the game with the top five rated players and the seventh team member. "That seventh player wasn't quite as good statistically, but the team always performed better when he was with them," the coach observed.

"I'm sure every coach has his own particular style," Schall added, but "statistics weigh quite heavily with me and we've been pretty successful using this method."

Players have, on occasion, privately refuted the computer's figures, Schall said, but they really don't have any basis for their disagreements. "There are other elements included in a game besides statistics and how a player performs. However, the ultimate thing is that if you don't perform well, then you can't be out there [on the court]," Schall noted.

Promoted to Olympics

His method of computerized "diagnostic counseling" was recently promoted from Graceland's campus to the arenas of the U.S. Olympics.

Earlier this year, Schall was appointed official statistician for the U.S. Olympic Coaching Staff, a position which allows him to practice his athletically-inclined technology on-line in the field. Using an Apple Computer microcomputer with 4K of memory, Schall monitors and records each Olympian's performance while a game is in progress.

In fact, Schall stated, "the computer was recently used at the Olympic's. Colorado Springs training camp to evaluate each player and make the final decision as to who would play on the U.S. team."

The microcomputer, because of its size and limited memory, "is a little slow," Schall stated. "We have a time problem with the information scrolling up on the unit's screen. It takes about 12 seconds for the information to appear and an awful lot can happen in volleyball in 12 seconds."

The innovative coach, not satisfied with statistics and team ratings, is currently experimenting with using the computer for advanced strategy planning.

"I'm always adding new wrinkles and new things to the computer with regards to volleyball," Schall commented. "In fact, I'm presently doing some research for the national team concerning just how much a 'pass' — good or bad — contributes to the success of a team." The computer correlations have found, for instance, that a "perfect pass contributes to a scoring play within two volleys about 50% of the time, whereas a poor pass contributes to scoring only about 11% of the time."

Schall conceded, however, that the "thrill of victory" does not necessarily hinge on the use of statistics alone, but on the ability of the players and the team as a whole.

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Breaking the Language Barrier

Part I

By Tom DeMarco

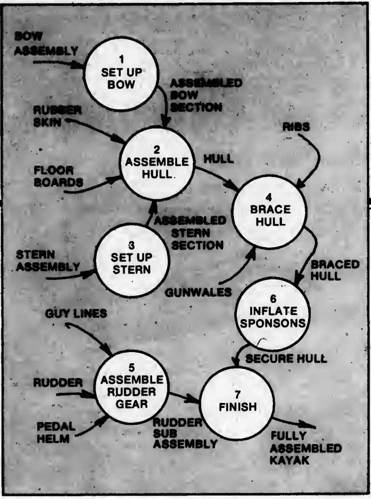

Figure 1

The systems analyst and the user are not independent entities; each depends on the other. When communication problems get in their way, however, the relationship can turn adversary.

The real problem in most system or program development efforts may be that English, left to itself, is too subtle, too open to personal interpretation, to be appropriate in the structured world of DP.

In this three-part series, excerpted from Structured Analysis and System Specification, *Tom DeMarco shows how to impose limits on our native language so analysts, designers, programmers and users can safely use it to define what they are trying to develop. This week he starts by giving some hints on that most basic of DP jobs, setting up the system.*

IN DEPTH
IN DEPTH
IN DEPTH

Let's get right to the point. This is about structured analysis, and structured analysis is primarily concerned with a new kind of functional specification, the structured specification. Figure 1 shows part of a structured specification.

The example I have chosen is a system of sorts, but obviously not a computer system. It is, in fact, a manual assembly procedure.

Procedures like the one described in Figure 1 are usually documented by a text narrative. Such descriptions have many of the characteristics of the classical functional specifications we analysts have been producing for the last 20 years. (The functional specification describes *automated* procedures — that is the main difference between the two.) Look at a portion of the text that prompted me to draw Figure 1:

> **Assembly Instructions**
> **For Klepper Folding Boats**
>
> 1. Lay out hull in grass (or on carpet). Select a clean, level spot.
>
> 2. Take folded bow section, lay it in grass, unfold four hinged gunwale boards. Kneel down, spread structure lightly with left hand near bow, place right hand on pullplate at *bottom* of hinged rib and set up rib gently by pulling toward center of boat. Deckbar has a tongue-like fitting underneath which will connect with fitting on top of rib if you lift deckbar lightly, guide tongue to rib, press down on deckbar near bow to lock securely. Now lift whole bow-section using both arms wraparound style (to keep gunwales from flopping down) and slide into front of hull. Center seam of blue deck should rest on top of deckbar.
>
> 3. Take folded stern section, (four "horseshoes" attached), unfold four gunwales, set up rib by pulling on pullplate at *bottom* of rib. Deckbar locks to top of rib *from the side* by slipping a snaplock over a tongue attached to top of rib . . .

And so forth.

The differences are fairly evident. The text plunges immediately into the details of the early assembly steps, while the structured variant tries to present the big picture first, with the intention of working smoothly from abstract to detailed. The structured specification is graphic and the text is not. The old-fashioned approach is one-dimensional (written narrative is always one-dimensional), and the structured variant is multidimensional.

There are other differences as well; we'll get to those later. My intention here is only to give you an initial glimpse at a structured specification.

Now let's go back and define some terms.

What Is Analysis?

Analysis is the study of a problem, prior to taking some action. In the specific domain of computer systems development, analysis refers to the study of some business area or application, usually leading to the specification of a new system. The action we're going to be taking later on is the implementation of that system.

The most important product of systems analysis — of the analysis phase of the life cycle — is the specification document. Different organizations have different terms for this document: functional specification, external specification, design specification, memo of rationale, requirements document.

In order to avoid the slightly different connotations that these names carry, I would like to introduce a new term here: the target document. The target document establishes the goals for the rest of the project. It says what the project will have to deliver in order to be considered a success. The target

(Continued on Page 20)

IN DEPTH

> *'. . . Analysis is frustrating, full of complex interpersonal relationships, indefinite and difficult. In a word, it is fascinating.'*

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document is the principal product of analysis.

Successful completion of the analysis phase involves all of the following:

- Selecting an optimal target.
- Producing detailed documentation of that target in such a manner that subsequent implementation can be evaluated to see whether the target has been attained.
- Producing accurate predictions of the important parameters associated with the target, including costs, benefits, schedules and performance characteristics.
- Obtaining concurrence on each of the items above from each of the affected parties.

In carrying out this work, the analyst undertakes an incredibly large and diverse set of tasks. At the very minimum, analysts are responsible for user liaison, specification, cost-benefit study, feasibility analysis and estimating. We'll cover each of these in turn, but first an observation about some characteristics that are common to all the analyst's activities.

Most of us come to analysis by way of the implementation disciplines — design, programming and debugging. The reason for this is largely historical. In the past, the business areas being automated were the simpler ones, and the users were rather unsophisticated; it was more realistic to train computer people to understand the application than to train users to understand DP technology.

As we come to automate more and more complex areas and as our users (as a result of prevalent computer training at the high school and college level) come to be more literate in automation technologies, this trend is reversing.

For the moment, however, I'm sure you'll agree with me that most computer systems analysts are first of all computer people. That being the case, consider this observation: Whatever analysis is, it certainly is not very similar to the work of designing, programming and debugging computer systems. Those kinds of activities have the following characteristics:

- The work is reasonably straightforward. Software sciences are relatively new and therefore not as highly specialized as more developed fields like medicine and physics.
- The interpersonal relationships are not very complicated nor are there very many of them. I consider the business of building computer systems and getting them to run a rather friendly activity, known for easy relationships.
- The work is very definite. A piece of code, for instance, is either right or wrong. When it's wrong, it lets you know in no uncertain terms by kicking and screaming and holding its breath, acting in obviously abnormal ways.
- The work is satisfying. A positive glow emanates from the programmer who has just found and routed out a bug. A friend of mine who is a doctor told me, after observing programmers in the debugging phase of a project, that most of them seemed "high as kites" much of the time. I think he was talking about the obvious satisfaction programmers take in their work.

The implementation disciplines are straightforward, friendly, definite and satisfying. Analysis is none of these things:

- It certainly isn't easy. Negotiating a complex target document with a whole community of heterogeneous and conflicting users and getting them all to agree is a gargantuan task. In the largest systems for the most convoluted organizations, the diplomatic skills that the analyst must bring to bear are comparable to the skills of a Kissinger negotiating for peace in the Middle East.
- The interpersonal relationships of analysis, particularly those involving users, are complicated, sometimes even hostile.
- There is nothing definite about analysis. It is not even obvious when the analysis phase is done. For want of

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better termination criteria, the analysis phase is often considered to be over when the time allocated for it is up.

- Largely because it is so indefinite, analysis is not very satisfying. In the most complicated systems, there are so many compromises to be made that no one is ever completely happy with the result. Frequently, the various parties involved in the negotiation of a target documentation are so rankled by their own concessions that they lose track of what a spectacular feat the analyst has achieved by getting them to agree at all.

So analysis is frustrating, full of complex interpersonal relationships, indefinite and difficult. In a word, it is fascinating. Once you're hooked, the old easy pleasures of system building are never again enough to satisfy you.

The User Liaison

During the 1960s, our business community saw a rash of conglomeration in which huge corporate monoliths swallowed up smaller companies and tried to digest them. As part of this movement, many centralized computer systems were installed with an aim toward gathering up the reins of management, and thus allowing the conglomerate's directors to run the whole show.

If you were an analyst on one of these large management information system (MIS) projects, you got to see the user-analyst relationship at its very worst. Users were dead set against their functions being conglomerated, and of course that's just what the MIS were trying to do.

The philosophy of the '60s was that an adversary relationship between the analyst and the user could be very productive, that analysts could go in, as the representatives of upper management, and force the users to participate and comply.

Of course the record of such projects was absolutely dismal. I know of no conglomerate that made significant gains in centralization through a large MIS. The projects were often complete routs. Many conglomerates are now spinning off their acquisitions and finding it rather simple to do so because so little true conglomeration was ever achieved.

Because of the experience of the '60s, the term MIS, even today, is likely to provoke stifled giggles in a group of computer people.

The lesson of the '60s is that no system is going to succeed without the active and willing participation of its users. Users have to be made aware of how the system will work and how they will make use of it. They have to be sold on the system. Their expertise in the business area must be made a key ingredient to system development. They must be kept aware of progress, and channels must be kept open for them to correct and tune system goals during development.

All of this is the responsibility of the analyst. He is the users' teacher, translator and advisor. This intermediary function is the most essential of all the analyst's activities.

The analyst is the middleman between the user, who decides what has to be done, and the development team, which does it. He bridges this gap with a target document. The business of putting this document together and getting it accepted by all parties is specification.

Since the target document is the analyst's principal output, specification is the most visible of his activities.

> *'The philosophy of the '60s was that an adversary relationship between the analyst and the user could be very productive, that analysts could go in, as the representatives of upper management, and force the users to participate and comply. Of course the record of such projects was absolutely dismal.'*

If you visit the Royal Naval Museum at Greenwich, England, you will see the results of some of the world's most successful specification efforts, the admiralty models. Before any ship of the line was constructed, a perfect scale model had to be built and approved.

(Continued on Page 22)

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> *'I have never heard of a project's success being credited to the fine estimates an analyst made, but the converse is frequently true — poor estimates often lead to a project's downfall and, in such cases, the analyst usually receives full credit.'*

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The long hours of detail work were more than repaid by the clear understandings that come from studying and handling the models.

The success of the specification process depends on the product, the target document in our case, being able to serve as a model of the new system. To the extent that it helps you visualize the new system, the target document is the system model.

The study of relative cost and benefits of potential systems is the feedback mechanism used by an analyst to select an optimal target. While structured analysis does not entail new methods for conduct of this study, it nonetheless has an important effect.

An accurate and meaningful system model helps the user and the analyst perfect their vision of the new system and refine their estimates of its costs and benefits.

It is pointless to specify a system which defies successful implementation. Feasibility analysis refers to the continual testing process the analyst must go through to be sure that the system he is specifying can be implemented within a set of given constraints.

Feasibility analysis is more akin to design than to the other analysis phase activities, since it involves building tentative physical models of the system and evaluating them for ease of implementation. Again, structured analysis does not prescribe new procedures for this activity. But its modeling tools will have some positive effect.

Estimation Procedure

Since analysis deals so heavily with a system which exists only on paper, it involves a large amount of estimating. The analyst is forever being called upon to estimate cost or duration of future activities, CPU load factors, core and disk extents, manpower allocation . . . almost anything.

I have never heard of a project's success being credited to the fine estimates an analyst made, but the converse is frequently true — poor estimates often lead to a project's downfall and, in such cases, the analyst usually receives full credit.

Estimating is rather different from the other required analysis skills;

- *Nobody is an expert estimator.* You can't even take a course in estimating, because nobody is willing to set himself up as enough of an authority on the subject to teach it.
- *We don't build our estimating skills, because we don't collect any data about our past results.* At the end of a project we rarely go back and carry out a thorough postmortem to see how the project proceeded. How many times have you seen project performance statistics published and compared with the original estimates? In my experience, this is done only in the very rare instance of a project that finishes precisely on time and on budget. In most cases, the original schedule has long since vanished from the record and will never be seen again.

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• *None of this matters as much as it ought to anyway, since most things we call "estimates" in computer system projects are not estimates at all.* When your manager asks you to come up with a schedule showing project completion no later than June 1 and using no more than six people, you're not doing any real estimating. You are simply dividing up the time as best you can among the phases. And he probably didn't estimate either; chances are his dates and manpower loading were derived from budgetary figures, which were themselves based upon nothing more than wishful thinking.

All these factors aside, estimating plays a key part in analysis. There are some estimating heuristics that are a by-product of structured analysis; these will be discussed in a subsequent chapter.

The key word here is *heuristic.* A heuristic is a cheap trick that often works well but makes no guarantee. It is not an algorithm, a process that leads to a guaranteed result.

Defensive Nature of Analysis

In addition to the analysis phase activities presented above, there are many others; the analyst is often a project utility infielder, called upon to perform any number of odd jobs. As the project wears on, his roles may change. But the major activities are user liaison, specification, cost-benefit and feasibility analyses and estimating.

In setting about these activities, the analyst should be guided by a rule which seems to apply almost universally: *The overriding concern of analysis is not to achieve success, but to avoid failure.* Analysis is essentially a defensive business.

This melancholy observation stems from the fact that the great flaming failures of the past have inevitably been attributable to analysis phase flaws. When a system goes disastrously wrong, it is the analyst's fault. When a system succeeds, the credit must be apportioned among many participants, but failure (at least the most dramatic kind) belongs completely to the analyst.

If you think of a system project that was a true rout — years late, or orders of magnitude over budget, or totally unacceptable to the user, or utterly impossible to maintain — it almost certainly was an analysis phase problem that did the system in.

Computer system analysis is like child-rearing; you can do grievous damage, but you cannot ensure success.

Problems of Analysis

My reason for presenting this concept here is to establish the following context for the rest of the book: The principal goal of structured analysis is to minimize the probability of critical analysis phase error. The tools of structured analysis are defensive means to cope with the most critical risk areas of analysis.

Projects can go wrong at many different points. The fact that we spend so much time, energy, and money on maintenance is an indication of our failures as designers; the fact that we spend so much on debugging is an indictment of our module design and coding and testing methods.

But analysis failures fall into an entirely different class. When the analysis goes wrong, we don't just spend more money to come up with a desired result — we spend *much* more money. And we often don't come up with any result.

> *'. . . The analyst should be guided by a rule which seems to apply almost universally: The overriding concern of analysis is not to achieve success, but to avoid failure. Analysis is essentially a defensive business.'*

That being the case, one might expect management to be superconservative about the analysis phase of a project, to invest much more in doing the job correctly and thus avoid whole hosts of headaches downstream. Unfortu-

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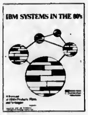

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nately, it is not as simple as that.

Analysis is plagued with problems that are not going to be solved simply by throwing money at them. You may have experienced this yourself if you ever participated in a project where too much time was allocated to the analysis phase.

What tends to happen in such cases is that work proceeds in a normal fashion until the major products of analysis are completed. In the remaining time, the project team spins its wheels, agonizing over what more it could do to avoid later difficulties. When the time is finally up, the team breathes a great sigh of relief and hurries on to design.

Somehow the extra time is just wasted — the main result of slowing down the analysis phase and doing everything with exaggerated care is that you just get terribly bored. Such projects are usually every bit as subject to failures of analysis as others.

I offer this list of the major problems of analysis:

1. Communication problems.
2. The changing nature of computer system requirements.
3. The lack of tools.
4. Problems of the target document.
5. Work allocation problems.
6. Politics.

Before looking at these problems in more detail, we should note that none of them will be *solved* by structured analysis or by any other approach to analysis. The best we can hope for is some better means to grapple with them.

A long-unsolved problem of choreography is the development of a rigorous notation to describe dance. Merce Cunningham, commenting on past failures to come up with a useful notation, has observed that the motor centers of the brain are separated from the reading and writing centers. This physical separation in the brain causes communication difficulties.

Computer systems analysis is faced with this kind of difficulty. The business of specification is, for the most part, involved in describing procedure. Procedure, like dance, resists description. (It is far easier to demonstrate procedure than to describe it, but that won't do for our purposes.)

Structured analysis attempts to overcome this difficulty through the use of graphics. When you use a picture instead of a text to communicate, you switch mental gears. Instead of using one of the brain's serial processors, its reading facility, you use a parallel processor.

All of this is a highfalutin' way to present a lowfalutin' and very old idea: A picture is worth a thousand words. The reason I present it at all is that analysts seem to need some remedial work on this concept. When given a choice (in writing a target document, for instance) between a picture and a thousand words, most analysts opt unfailingly for the thousand words.

Communication problems are exacerbated in our case by the lack of a common language between user and analyst. The things with which we analysts work — specifications, data format descriptions, flowcharts, code, disk and core maps — are totally inappropriate for most users.

The one aspect of the system the user is most comfortable talking about is the set of human procedures that are his interface to the system, typically something we don't get around to discussing in great detail with him until well after analysis, when the user manuals are being written.

Finally, our communication problem is complicated by the fact that what we're describing is usually a system that exists only in our minds. There is no model for it. In our attempts to flesh out a picture of the system, we are inclined to fill in the physical details (CRT screens, report formats and so forth) much too early.

To sum it up, the factors contributing to the communication problems of analysis are:

- The natural difficulty of describing procedure.
- The inappropriateness of our method (narrative text).
- The lack of a common language between analyst and user.
- The lack of any usable early model for the system.

Changing Nature of Requirements

I sometimes think managers are sent to a special school where they are taught to talk about "freezing the

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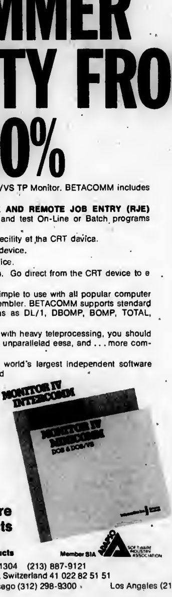

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specification" at least once a day during the analysis phase. The idea of freezing the specification is a sublime fiction. Changes won't go away and they can't be ignored.

If a project lasts two years, you ought to expect as many legitimate changes (occasioned by changes in the way business is done) to occur during the project as would occur in the first two years after cutover.

In addition to changes of this kind, an equal number of changes may arise from the user's increased understanding of the system. This type of change resutls from early, inevitable communication failures, failures which have since been corrected.

When we freeze a target document, we try to hold off or ignore change. But the target document is only an approximation of the true project target; therefore, by holding off and ignoring change, we are trying to proceed toward a target *without benefit of any feedback.*

There are two reasons why managers want to freeze the target document. First, they want to have a stable target toward which to work; second, an enormous amount of effort is involved in updating a specification. The first reason is understandable, but the second is ridiculous.

It is unacceptable to write specifications in such a way that they can't be modified. Ease of modification has to be a requirement of the target document.

Change of Rules

This represents a change of ground rules for analysis. In the past, it was expected that the target document would be frozen. It was a positive advantage that the document was impossible to change since that helped overcome resistance to the freeze.

It was considered normal for an analyst to hold off a change by explaining that implementing it in the target document would require retyping every page. I even had one analyst tell me that the system, once built, was going to be highly flexible, so it would be easier to put the requested change into the system itself rather than to put it into the specification!

Figures collected by GTE, IBM and TRW over a large sample of system changes, some of them incorporated immediately and others deferred, indicate the difference in cost can be staggering. It can cost two orders of magnitude more to implement a change after cutover than it would have cost to implement it during the analysis phase.

As a rule of thumb, you should count on a 2:1 cost differential to result from deferring change until a subsequent project phase.

My conclusion from all of this is that we must change our methods; we must begin building target documents that are highly maintainable. In fact, maintainability of the target document is every bit as essential as maintainability of the eventual system.

Analysts work with their wits plus paper and pencil. That's about it. The fact that you are reading this implies you are looking for some tools with which to work. For the moment, my point is that most analysts don't have any.

As an indication of this, consider your ability to evaluate the products of each project phase. You would have little difficulty evaluating a piece of code. If it were highly readable, well submodularized, well commented, conformed to generally accepted programming practice and had no GOTOs, ALTERs or other forms of pathology, you would probably be willing to call it a good piece of code.

> *'The idea of freezing the specification is a sublime fiction. Changes won't go away and they can't be ignored.'*

Evaluating a design is more difficult, and you would be somewhat less sure of your judgment.

But suppose you were asked to evaluate a target document. Far from being able to judge its quality, you would probably be hard-pressed to say

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IN DEPTH

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whether it qualified as a target document at all. Our inability to evaluate any but the most incompetent efforts is a sign of the lack of analysis phase tools.

Obviously the larger the system, the more complex the analysis. There is little we can do to limit the size of a system; there are, however, intelligent and unintelligent ways to deal with size.

An intelligent way to deal with size is to *partition*. That is exactly what designers do with a system that is too big to deal with conveniently — they break it down into component pieces (modules). Exactly the same approach is called for in analysis.

The main thing we have to partition is the target document. We have to stop writing Victorian novel specifications, enormous documents that can only be read from start to finish. Instead, we have to learn to develop dozens or even hundreds of "mini-specifications." And we have to organize them in such a way that the pieces can be dealt with selectively.

Beside its unwieldly size, the classical target document is subject to further problems.

- It is excessively redundant.
- It is excessively wordy.
- It is excessively physical.
- It is tedious to read and unbearable to write.

Adding manpower to an analysis team is even more complicated than beefing up the implementation team. The more successful classical analyses are done by very small teams, often only one person.

On rush projects, the analysis phase is sometimes shortchanged since people assume it will take forever, and there is no convenient way to divide it up.

I think it obvious that this, again, is a partitioning problem. Our failure to come up with an early partitioning of the subject matter (system or business area) means we have no way to divide up the rest of the work.

Analysis and Politics

Analysis is, of course, an intensely political subject. Sometimes the analyst's political situation is complicated by communication failures or inadequacies of his methods. That kind of problem can be dealt with positively — the tools of structured analysis, in particular, will help.

But most political problems do not lend themselves to simple solutions. The underlying cause of political difficulty is usually the changing distribution of power and autonomy that accompanies the introduction of a new system. No new analysis procedures are going to make such an impending change less frightening.

Political problems aren't going to go away and they won't be "solved." The most we can hope for is to limit the effect of disruption from politics.

Structured analysis approaches this objective by making analysis procedures more formal. To the extent that each of the analyst's tasks is clearly (and publicly) defined and has clearly stated deliverables, he can expect less political impact from them.

Users understand the limited nature of his investigations and are less inclined to overreact. The analyst becomes less of a threat.

User-Analyst Relationship

Since structured analysis introduces some changes into the user-analyst relationship, I think it is important to begin by examinig this relationship in the classical environment. We need to look at the user's role, the analyst's role and the division of responsibility between them.

First of all, there is rarely just one user. In fact, the term "user" refers to at least three rather different roles:

- *The hands-on user,* the operator of the system. Taking an on-line banking system as an example, the hands-on users might include tellers and platform officers.
- *The responsible user,* the one who has direct business responsibility for the procedures being automated by the system. In the banking example, this might be the branch manager.
- *The system owner,* usually upper management. In the banking example, this might be the vice-president of banking operations.

Sometimes these roles are combined, but most often they involve distinctly different people. When multiple organizations are involved, you can expect

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the total number of users to be as many as three times the number of organizations.

The analyst must be responsible for communication with *all* of the users. I am continually amazed at how many development teams jeopardize their chances of success by failing to talk to one or more of their users.

Often this takes the form of some person or organization being appointed "user representative." This is done to spare the user the bother of the early system negotiations and to spare the development team the bother of dealing with users.

User representatives would be fine if they also had authority to accept the system. Usually they do not. When it comes to acceptance, they step aside and let the real user come forward. When this happens, nobody has been spared any bother.

What Is an Analyst?

The analyst is the principal link between the user area and the implementation effort. He has to communicate the requirements to the implementors and the details of how requirements are being satisfied back to the users.

He may participate in the actual determination of what gets done. It is often the analyst who supplies the act of imagination that melds together applications and present-day technology.

And he may participate in the implementation. In doing this, he is assuming the role that an architect takes in guiding the construction of his building.

While the details may vary from one organization to the next, most analysts are required to be:

- At ease with DP concepts.
- At ease with the concepts particular to the business area.
- Able to communicate such concepts.

There is something terribly wrong with a user-analyst relationship in which the user specifies such physical details as hardware vendor, software vendor, programming language and standards. Equally upsetting is the user who relies upon the analyst to decide how business ought to be conducted. What is the line that separates analyst functions from user functions?

I believe the analyst and the user ought to try to communicate across a "logical-physical" boundary which exists in any computer system project. Logical considerations include answers to the question "*What needs to be accomplished?*" These fall naturally into the domain of the user.

Physical considerations include answers to the question "How shall we accomplish these things?" These are in the domain of the analyst.

Tom DeMarco is a senior staff consultant with Yourdon, Inc. in New York and is the creator of Yourdon's Structured Analysis and System Specification Workshop and Structured Analysis/Design Workshop. He is also author of a forthcoming seven-part series on structured analysis from Deltak, Inc.

Early in his career, DeMarco worked on the ESS-1 project at Bell Telephone Laboratories. Later, under contract to IBM, he served as manager of an early time-sharing experiment on the then new IBM 360 system.

In subsequent assignments, DeMarco was responsible for implementing several very large distributed processing systems.

DeMarco holds a B.S. in electrical engineering from Cornell University, an M.S. from Columbia and a Diplome from the University of Paris (Sorbonne).

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Editorial

Difficult, But Necessary

Everybody knows it now costs 2 cants more to mail a letter than it did this time last year. That's an increase of about 15%. While that was happaning to John Q. Public, Computer*world*'s postage rates were going up, too. For example, between May 29 and July 6 — a 35-day period — our postage costs increased by 50%.

Because of these costs and other increases in the cost of doing business, Computer*world* must increasa its U.S. subscription rate to $25 — or about 50 cents an issua.

This decision wasn't easy.

As a weekly newspaper, we have distribution problems and costs that far exceed those facing monthly publications. For one thing, we have 51 issues a year instead of 12, and for any of these issues to be of value to you, it is imperative that you receive them as quickly as possible.

Several years ago, in the face of declining surface deliveries we instituted a costly, but effective series of airlifts. Each waek, most copies of Computer*world* are loaded into containars and airlifted diractly from our printer in Chicago to five U.S. Postal Service (USPS) centers around the country, where they then enter the postal system.

Even with this airlift program, tha USPS daliveries continue to deteriorate — at the same time postal costs for Computer*world* have risen dramatically.

In 1979, when the post office completes its eight-year phasing program of increasad rates for newspapers like Computer*world*, it will have increased ratas by 413%.

In addition, wa've experienced dramatic increases in the cost of paper as well as less dramatic, but painful, increases in the cost of averything elsa.

We hope you agree that even with this increasa, Computer*world* continues to be worth its cost to you, and for our part, we'll try to continue to meet your expectations for a high quality newsweekly.

Data Past

Five Years Ago
August 8, 1973

NEW YORK — Judge David N. Edelstein found IBM in civil contempt of court and fined it $150,000 per day effective Aug. 3, 1973 until its delivery of certain specified documents to the Justice Department. IBM was found in contempt for its failure to comply with Pretrial Order No. 5, entered Sept. 26, 1972, which required IBM to produce to the Justice Department documants IBM claimed were privilagad under tha attorney-client relationship.

— — —

WASHINGTON, D.C. — Health, Education and Welfare (HEW) Secretary Caspar Weinbergar accepted and endorsad the HEW Computer Committee's recommendation that a Code of Fair Information Practica become law. Some of the provisions were that the coda should dafine "fair information practice" as adharing to specified safeguards, that keepers of files must give public notice of tha existence and character of the systems at least annually and that keepers of the systems must inform subjects of individual rights.

Eight Years Ago
August 12, 1970

CORPUS CHRISTI, Taxas — Hurricane Celia hit this south Texas city nina days ago, devastating DP centars as she went. Tha centers wera left in a shamble of broken glass and muddy water filled with floating punch cards.

— — —

MINNEAPOLIS — Control Data Corp. introduced a scaled-down version of the CDC 3300, featuring multiprogramming capability. The CDC 3170, intanded to compete with the IBM 360/40 and 50, the Burroughs Corp. B3500 and B4500, the Honaywell Information Systems, Inc. 2200 and 3200 and tha XDS Sigma 6, represanted CDC's bid to bring some of the 3300's multiprogramming power into the price range of the 3100.

Letters to the Editor

Article Stands in Contrast

"User-Buyer Gaps" [CW, July 10] stands in strange contrast to the articles on Sen. Abraham Ribicoff's bill S. 1766, tha Federal Computer Systams Protection Act of 1977, tha Ganeral Accounting Office (GAO) criticism of the Department of tha Interior's planning, Federal Reserve security for Fedwire and security in U.S. data centers.

Tha editorial, in effect, said that U.S. Geological Survey users complain that their DP is inefficient and inhibited because of extensive security capabilities within the system.

The thrust of the other articles was that data in computer systams is usually there because it has value and should be adequately controlled, protected and processed. Tha aditorial seemed to say users shouldn't be burdened by security overhead, but the editorial does not comment on the possible myopia of a user in evaluating the organization's overall need for data security.

Frankly, if I, as a private citizen or organization, ware required to submit geological data to the U.S. for evaluation, or other confidential information for taxes or programs such as are currently being proposad for the oil industry, I would ba most concernad that the computer system on which such data is recordad, as well as the procadures for government workers who have access to the data, hava specific and adequate security safaguards.

The security of all types of data is a serious tachnical problem and public policy issua. If the Department of tha Interior heeds the GAO's advice about graatar departmentwide DP management and control, I expact mora user groups within the department will complain that their neads have been suboptimized — but one result may be a much mora comfortable laval of security for data stored in Interior's systems.

Oliver R. Smoot
Vice-President
Computer and Business Equipment
Manufacturars Association
Washington, D.C.

Keep Chronology Straight

I was surprised to note in "Series/1 Gets Cobol" [CW, July 3] the statement that IBM's channel attachmant "reportedly represents the first direct channel link between the Series/1 and IBM's largest mainframes."

This was reported incorrectly, since Associated Computer Consultants in California beat IBM by more than three months with its S1/370 channel attachment announced in early March and described by Computer*world* on April 3.

It's good to sea the chronology kapt straight.

Ralph H. Fertig
Associated Computer Consultants
Santa Barbara, Calif.

Preventing Privacy Abuse

Matching welfare rolls, tax rolls and payrolls should not pit efficiency against privacy. Corporations and tax agencies that lend their files to welfara agencies should first strip those files of personal datails.

The loan of a bare list of numbers, names and addresses of taxpayers or employees whose income exceeds walfare eligibility would pravent abuse of privileged information.

Richard H. Shulman
Bronx, N.Y.

Computer*world* welcomes comments from its readers. Letters should be addressed to: Editor, Computerworld, 797 Washington St., Newton, Mass. 02160.

The Human Connection

Home DP Too Rinky-Dink for Businesses

By Jack Stone
Special to CW

Here is a report on my most recent adventures in the quest for a $5,000 micro-based small business system to outfit my totally automated floating consultant's office.

You may remember the last episode ended with the glorious dockside party I gave for my undelivered, undebugged computer [CW, July 17].

Well, since that time, I have acquired and installed an interim system on my cruiser to give me word processing support for a short-fuse writing assignment of a large customer. Although it's the best system around in my price range, it still meets only a small part of my total need. So, I'm forced into achieving (for me, anyway) the impossible; upgrading my multivendor microsystem in the field (marina) and making it work!

With diligence and a proper attitude, I expect to succeed, especially knowing I can always pay my vendor to clean up foul-ups. Besides, the whole affair should be good for laughs, which are needed to survive in the micro business.

But if my general ineptitude gets in the way of success, I'll just unload the machine on one of those computer junk dealers who advertise in *On-Line* (out of Los Gatos, as you might expect), a hobbyists' buy/sell/swap newspaper saturated with print-so-small-it's-impossible-to-read classifieds and whose only virtue seems to be that it is not published more often than, says its heading, "17.3925 iss/yr."

Yet Another Joke

Speaking of jokes, a few weeks ago an ad for a home computer show appeared in the *Post*. My 15-year-old son Joe found it and telephoned me on the boat to tell me the show title was "Amateur Computing 78" and that the ad was located in the special part of the entertainment section that displayed the ads for the girlie shows and videotape productions for mature people.

Of course, I was suspicious of Joe's remarks both as to the placement of the ad and his recreational interests. The latter I could believe, but I couldn't accept the fact that a computer show would classify itself as X-rated. So I bought a newspaper and found he was right.

What style changes have come upon our illustrious industry! Our magnificent technology has been extracted from the research laboratory and unceremoniously dumped into the garbage can.

And I further concluded that the show must be legit because the hotel address (Columbia Pike and Arlington Blvd) in the ad was wrong (they don't intersect), an error of a class to be expected from the promotion of a home-brew compute-out.

I arrived a few minutes after the opening (Saturday, 10 a.m.) and was pleasantly surprised to find there was no charge to visit the exhibits. (I learned later there was a $5 admission fee, but obviously no one was assigned to the collections task.)

Quick Slide

But my "high" rapidly dissipated into a "low" as I made a quick tour around the area. Frankly it had all the airs of a refugee sideshow that couldn't make it in a third-rate county fair. The show managers clearly believed that, to attract the computer hobbyists, it was mandatory that the show production be amateurish and that the computers be demonstrated in toy mode. In only this sense was the show a success.

But, as I made my rounds of the booths, the exhibit area took on a new light — that of a computer-based slapstick comedy! I'll share my adventures there with you in next week's column, but here's one tidbit to tide you over.

There was a "genuwine" mom and pop computer store operation — Tom Gibson and wife's Tiny C. Associates — which featured their 11-year-old son/computer scientist out in front of the booth, demoing a cassette-tape computer plaything whose core component resembled that of the "Apple" mainframe.

The kid explained to me that his software supports a programming language which is an infinitesimal subset of the Bell Labs "C" compiler language, hence "Tiny C." He said he expected the price of the software product to drop radically as experience is obtained in the marketplace. Meanwhile, the product is being offered for a $60 one-time charge, including, I believe, documentation and maintenance support until 2001.

Letters to Stone should be addressed to him at Suite 222, 2233 Wisconsin Ave., N.W., Washington, D.C. 20007.

Reader Commentary

Certification Does Not Create Professionals

By Jeff D. Murphy
Special to CW

At a recent National Computer Conference session entitled "What Is Professionalism," Dr. Gary Casper, president of the Institute for the Certification of Computer Professionals (ICCP), presented the interesting thesis that professionalism is established by regulation. He led into this idea by saying that "public concern about privacy threats and other social implications of computers has mounted steadily and fueled growing demands for increased professionalism in the DP field" (this and all other quotes are taken from "Regulate Selves or Be Regulated, DPers Warned," [CW, June 19].

Now, before we proceed to the logical permutations of this thought, let us examine in some depth what the good doctor said. We can agree, of course, that there exists a concern regarding the threats to privacy that our industry makes possible. It is not unreasonable to believe that many DP professionals feel that same concern.

We do know that this concern has been expressed by agitation in Congress for the regulation of data transmission and for better security systems, but we also know that the fear in the minds of most of us can be summarized in the concepts of 1984, "Big Brother" and "police state." This is what the privacy fight is all about.

But Casper played on this very fear when he said the fear of loss of privacy has "fueled growing demands for increased professionalism in the DP field," — not the demand for regulation of data, but the demand for professionalism. Thus he created the premise that if the DP industry is not professional, it will be regulated.

By using the word "professionalism," he sets up for the logical corollaries that follow, and their translations:

1) "To meet these demands, computer professionals should set minimum standards of competence for their peers . . . " You are all members of a vast priesthood and should determine who would be allowed to undergo the rites of passage.

2) "Whatever method of enforcement they choose, DP personnel must soon adopt a uniform code of professional standards." The standards must be uniform; we cannot leave this to uninitiated heathen who know not our ways. Colleges and universities would provide degrees which would only confuse the rest of the world, like they do now in other fields. Who can tell if Harvard has a better business

(Continued on Page 30)

The Taylor Report

Should Auditors Offer DP-Related Services?

By Alan Taylor
Special to CW

The role of auditors who sell their firm's expertise has been challenged in many ways during the past few years, but probably never as directly as they will be by the hearings set for Aug. 17-18 in Chicago before the Public Oversight Board (POB), composed of members of American Institute of Certified Public Accountants (Aicpa).

On the one hand, auditors who want to increase the scope of their selling activities are pushing for a definition of their accounting skills as skills "in data and the interpretation of data" — thus apparently lifting any limits that the accounting field ever imposed upon the area in which auditors could offer their management advisory services. In particular, this expansion of role will include estimates, computerized or not, and other soft data.

At the same time, there is the question of whether the independence of auditors is being compromised by the offering of management advisory services — which can and do include programming, systems design and computer selection. A possible conflict of interest could arise with auditors reviewing their own services.

It is generally agreed there should be role limitations set for auditors. For instance, DP-servicing auditors should not go as far as facilities management, as this involves making management decisions. But what should these limits be?

A recent Senate Subcommittee on Reports, Accounting and Management called for restricting auditors dealing with publicly owned corporations to provide only "services related to accounting [which] are confined to the limited area of providing certain computer and systems analyses that are necesary for improving internal control procedures of corporations." Thus, another aspect of the matter is introduced.

Unfair Competitive Edge?

Yet another important issue has been raised — that of unfair competition. Here, the question is whether audit firms, because of their audit functions with their clients, may have an unfair competitive advantage in selling to those clients management advisory services which could be furnished by other DPers.

Still another aspect concerns what would happen if certain management advisory services currently being offered by auditors were forbidden in the future. Would, for instance, the sale of a service to which there is

(Continued on Page 30)

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Should Auditors Offer DP Services?

(Continued from Page 29)

currently no objection create a privileged class of suppliers which would be permitted to continue offering these services even if they were forbidden later?

With the Chicago hearings, we are being given an opportunity to be heard and to give examples of what we like and don't like. Persons in the DP field are invited to make suggestions concerning the expansion of auditors' roles by writing to the POB.

It appears there has been very little available data in some areas. We do not know whether we are dealing with fancied or real dangers because searches for data have failed to document them.

The POB's current procedure — in a notice dated July 7 which took more than a week to get out, it called for submissions by Aug. 7 — is typical of the type of search predestined to failure; it neglected to consider the time needed for outside interests to gather such data.

However, despite the time shortage, I urge readers to take advantage of the current opportunity by sending their ideas about role boundaries for auditors to Louis Matusiak, Public Oversight Board, File No. 20721, 1270 Ave. of the Americas, New York, N.Y. 10020.

Alternatively, you can fill in the accompanying questionnaire and send it to me for inclusion in a later roundup of opinions.

Do Auditors Need Curbs?

1. Do auditors selling DP-related services have an unfair competitive edge? Yes ______ No______
Which services?______________________________
____
2. Does an auditing firm damage its integrity by selling such services to its auditing clients? Yes_____ No_____
If you know of any cases, please describe briefly:______________
____
____
3. Should auditors of publicly owned companies be restricted from selling management advisory services — including programming, systems design and system selection — to such companies? Yes_____ No_____
4. What other areas of concern would you like to see considered?
____
____

Name ____________________ Position ______________
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Return to Alan Taylor, Computerworld, 797 Washington St., Newton, Mass. 02160. Detailed answers are welcome.

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Professionals Not Made by Regulation

(Continued from Page 29)

program than the University of Washington?

3) "If they hesitate, the push for increased regulation of DP competence will come from the government or some other source ..." Shades of Big Brother! We must not allow them to get a toehold.

4) " ... the public has begun to expect of DP personnel the same standards of professional competence, accountability and integrity that had formerly been reserved only for the more traditional professions like law and medicine ..." Law and medicine? Accountability and integrity? How old is this man?

5) "Not only would a nationwide certification program preempt future attempts by the non-DP world to regulate activities of DP specialists, but it would also reap more positive benefits like fostering high ethical standards ... " Right. Just like in law and medicine, eh?

Although it may not seem possible from the tone of this article, I do not object to some type of certification. However, I believe this can be handled adequately by existing educational institutions. I certainly do not want to see myself represented by a DP version of the American Medical Association, especially when I know that those holding a certificate from the ICCP currently comprise only about 1% of all programmers and analysts.

I hate to think that at some time in the future this will be solidified into a kind of prehistory of computing — an irrational age during which businesses negotiated with individuals, instead of the Union of Data Processing Professionals, and in which we were free from the benevolent domination of the International Institute for the Certification of Computer Professionals.

People are being misled by the kind of logic presented by Casper, and this is more the issue than certification. Let those who think they need the certificate get it, but let us not hear that they are more professional (or ethical, or competent) than the other 99% of the industry.

Murphy is programmer/analyst with Puget Sound Industries, Inc. an accounting firm in Bellevue, Wash.

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Under VS Environments

'CICS/DS' Backs Symbolic Debugging

LONG BEACH, N.Y. — Claimed to be the first Cobol-oriented symbolic debugging system for CICS/VS users, the CICS Interactive Symbolic Debugging System (CICS/DS) has been introduced by Virtual Systems Software, Inc. (VSS).

Although there are several other CICS testing and debugging packages around, they are all Assembly language-oriented, "dealing with machine code, base registers, bits, bytes and core dump format displays," a VSS spokesman said, and an informal check of directories confirmed his statement.

CICS/DS, on the other hand, is completely symbolic and allows the user to use Cobol verbs as debugging commands, referencing the symbolic data names, paragraph names or statement numbers defined in the application program being tested.

Whether working under DOS/VS, VS1 or MVS, the user has the ability to interactively step through the Cobol program one statement at a time, he noted. Under control of CICS/DS, the system will pause after each statement.

At each pause, the user can display and alter any data area, alter the sequence of the problem program logic (through use of the GOTO verb) or simply permit continued execution of the program without any change, he said.

Alternatively, the user may selectively set breakpoints, allowing the program to run until it reaches any one of those points, at which time the operation will pause and allow the user to perform any of the things he can do if the debugging is being run in a statement-by-statement mode.

The breakpoints can be specified through references to source code paragraph names or statement numbers, and CICS/DS provides the user with the ability to keep track of what is being planned in current tests through a sorted display of all active program stops, VSS noted.

In addition to user-picked breakpoints, the package also traps and displays any program check or CICS Abend related to the application program being tested. The display will contain the Cobol verb that caused the problem and the source statement number which contained the verb.

The CICS Abend code or a description of the program check will also be included in the display so the user can investigate the problem further with the same tools available to him at the scheduled breakpoints.

CICS/DS costs $9,500, according to the VSS spokesman at 90 Vinton St., Long Beach, N.Y. 11561.

Vortex Enhanced by Univac

IRVINE, Calif. — Several enhancements, including software changes and a firmware "accelerator" package, have been introduced by Univac's Minicomputer Operations here to increase the performance and utility of the Vortex-II multitask operating system for its V77 series minis.

The software modifications range from a multitasking output spooler to magnetic tape label checking, simplified system generation procedures, a submonitor error control facility and enhanced debugging support, according to a spokesman, who noted these changes are available immediately for both V77-400 and V77-600 users.

The firmware "accelerator," available only for the V77-600, is said to provide users with a 20% to 40% increase in CPU cycles since it speeds execution of Vortex-II resident modules.

The accelerator package requires 1,024 words of writable control store (WCS), a high-speed memory available in 512-, 1,024- and 2,048-word increments up to a maximum of 4,096 64-bit words, he said.

With 1,024 words of WCS, the user can implement the accelerator, and with 2,048 words of WCS he can concurrently implement the previously available "commercial" and "scientific" firmware packages in addition to the accelerator.

The accelerator is said to provide "significant" throughput improvements in multitasking environments.

The WCS hardware costs $4,000 for 1,024 words or $7,500 for 2,048 words. There is no charge for the firmware packages themselves, Univac emphasized, noting the accelerator should be ready in the fourth quarter.

Other Enhancements

The spooler facility included in the Vortex-II software upgrade supports both background and foreground tasks, the spokesman said. It includes operator control of print operations from the spool files.

The label-checking feature includes support for IBM-compatible labels on 9-track, 800- and 1,600 bit/in. tapes so the system now allows swapping of tapes between V77s and IBM 360s and 370s.

The error control facility added to the system allows users to trap abnormal situations and turn them over to correction routines for resolution. Error reporting now includes diagnostic information to show the cause as well as the type of problem.

The debugging capability allows trapping and troubleshooting between user applications and the Vortex-II nucleus. An enhanced memory dump allows user-selectable error dumping and, with it, more comprehensive analysis of the dumped material, the spokesman said.

'JCLMacs-II' Supports OS Proclibs

VALLEY FORGE, Pa. — The JCLMacs package from Management and Computer Services, Inc. (Macs) has been enhanced: the updated version, JCLMacs-II enables users to reorganize and structure JCL in a procedure library (Proclib) and produce a cross-reference listing of an entire Proclib or its individual members as well as generate standardized JCL, a spokesman said.

At the same time, he continued, the repackaging provides a mechanism to maintain documentation for operations, quality assurance personnel, programmers and analysts.

When required to generate JCL, JCLMacs-II accepts parameter cards containing only minimal information and, working from predefined installation-specific models, produces error-free JCL, including sort streams, in either punched cards or as entries in a Proclib, he explained.

In addition, the package can be used to generate model or normal DSCBs for generation data groups, he noted.

Described as flexible enough to meet any OS JCL coding requirement, JCLMacs-II will accept OS JCL, utility control cards and JCLMacs cards intermixed and will produce output in the same sequence as the input, substituting generated OS JCL for the JCLMacs cards, according to the spokesman.

Cross-reference listings can be produced for any entire Proclib or any member; standard cross-references include Data Set Name, Program Name, Unit and Volume Serial Numbers, but others can be added, he said.

The package provides the means to develop and then maintain standard documentation in the user's source library. Production "run sheets" to be completed by the programmer and write-ups for normal job steps as well as sort steps are among the items produced with this facility, the spokesman said.

JCLMacs-II is available now for $2,500. The vendor is at 790 Valley Forge Plaza, Valley Forge, Pa. 19482.

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APL Meeting Planned

TORONTO — I.P. Sharp Associates is sponsoring an international APL users' conference here at the Hotel Toronto Sept. 18-20 that will feature speakers from North America and Europe.

Sessions will be provided for specific industry segments, according to a spokeswoman, who noted that petroleum and other natural resource companies will be represented along with insurance firms, banks and other financial institutions and organizations dealing with large-scale logistical systems.

One day of the conference will be devoted to proposed extensions to the language, extensions to the system that supports it and extensions to the APL facilities provided on Sharp's remote-computing network, the spokeswoman added.

Two courses — described as advanced in nature — will be given concerning the use of APL in systems design and in data base design.

The final conference session will cover APL standards for documentation and programming and aspects of APL programming style.

The registration fee is $145. More information is available from Rosanne Wild at Sharp's offices, 145 King St., Toronto, Ont. M5H 1J8, Canada.

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'SMT' Aids Range of Personnel Concerned With System Tuning

CHERRY HILL, N.J. — The Systems Management Tool (SMT) recently introduced by Value Computing, Inc. (VCI) is said to be more than an on-line performance monitor. It is a multidimensional package that aids operations, systems programming and production control personnel, according to VCI.

Intended for IBM OS/VSI and MVS users, the package provides operations with an "early warning" system that signals pending job "time outs" and allows the times to be reset. This avoids costly reruns, the spokesman claimed.

Real-Time Displays

Real-time displays of job statistics "go beyond the usual operating system information" and give the user a larger measure of control, he added.

For the systems programmer, SMT provides real-time displays of control blocks, entry points and system resources such as CPU and channel utilization and device activity.

Beyond that, text-editing commands allow real-time editing as required; "on-line multilevel zaps" are also part of the user's "bag of tricks" with SMT, he said.

Meanwhile, production control personnel can access a real-time system monitoring facility for fine-tuning job schedules to be sure high priority jobs get appropriate treatment within the system. Job submissions through an internal reader are also an integral part of the SMT system, the spokesman continued.

Graphics

The package is a graphics-oriented system. It will run as a batch-submitted job or as a system task and is accessible from either a local IBM 3277 or an authorized operator 3277 console — with its own internal security to protect against unauthorized access, the company claimed.

The package costs $5,000 from VCI at 300 W. Marlton Pike, Cherry Hill, N.J. 08002.

Package Eases Control Of OS-Based Work Flow

DALLAS — UCC Seven, an automated production control system from University Computing Co. (UCC), was designed to provide control for the many elements involved with managing work flow through any IBM OS- or OS/VS-oriented data center.

All activity areas, or workstations, can be managed through UCC Seven by centralizing the required information in a single data base and by providing flexible facilities for using this information, a spokesman said.

UCC Seven has been developed as an on-line system with all of its facilities integrated into a single package. The system includes automatic scheduling of all work (non-CPU activities as well as CPU jobs), automatic submission of CPU jobs when all processing requirements have been satisfied and continuous monitoring of all activity with prompting for tasks which become late, he explained.

On-line inquiry facilities are available for obtaining current status and documentation stored in the data base. Maintenance to JCL libraries and the data base is accomplished using on-line menu service and formatted screens.

A text editing feature is also offered, the spokesman noted.

The ability of UCC Seven to control a data center's workload not only can help ensure that current service level requirements are met, the spokesman claimed, but also that additional work and new demands "can be assimilated without disrupting established service to the user community," the spokesman asserted.

The package costs $32,500 from the company at 8303 Elmbrook Drive, P.O. Box 47911, Dallas, Texas 75247.

'Acid' Processes Texts On PDP-8 Utilizing OS/8

OAK PARK, Ill. — Automatic hyphenation and line justification in manuals, correspondence and other documents are said to be two features of a text-generating program introduced by Dewar Information Systems Corp. for users of Digital Equipment Corp.'s PDP-8 systems.

The Automatic Cross-Referencing and Indexing Document (Acid) generator runs under the OS/8 operating system with a minimum 8K memory, a spokesman said. Documentation can be produced with virtually no special text commands, and sections of text can be updated or deleted without having to reform surrounding section numbers, he added.

Acid makes more than one pass over the source document so symbolic references to section headers are subsequently translated into absolute section and page numbers for the final output document, the spokesman explained.

To promote clarity, the program adds extra line spaces to the text when punctuation is not present and offers automatic leading or filling out of the remaining space on a line with the same character.

No Large Gaps

The hyphenation function eliminates large gaps of white space and enhances the legibility of the final document, the spokesman claimed.

Other features include conditional and unconditional page ejects, vertical line positioning, a provision for running titles with current and total pagenumbers and an optional double-column mode which generates two independently justified and hyphenated columns side-by-side, the spokesman related.

The Acid package license sells for $125 and the source files and listings are available for an additional $175 from the firm at 221 W. Lake St., Oak Park, Ill. 60302.

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More than a computer company

Developer Finds Way to Cut Compile Times

By James M. McCormack
Special to CW

NEWTON, Mass. — McCormack & Dodge Corp. is a software company in the financial segment of the industry. Since our major activity centers around the development and refinement of Cobol programs, we went from single-shift use of a 64K IBM 360/30 to triple-shift use of a 512K IBM 360/50 within a span of three years.

Our percentage of compile/-link time to total computer utilization has always been high because of the nature of our business which is not a typical user's production load.

For this reason, we were attracted to a recent, small classified advertisement, in one of the industry publications, that briefly described a product that would decrease the throughput time required for Cobol compiles and links by 50%.

Our interest was obvious, since we would literally be able to free up 25% of our mainframe — along with halving the turnaround time for our large programming staff.

The product from Odyssey Systems, Inc., is called simply "OP/C," which stands for Optimize Compiles. Although we are in the early stages of using this systems software package, we find it remarkable in that it accomplishes a true machine load reduction for compiles/links in three fundamental resource areas. It reduces CPU time up to 40%, system occupancy up to 80% and I/O events up to 75%.

These reductions have been achieved without impairing the efficiency or throughput of tasks unrelated to OP/C.

For our company, the most obvious benefits are:

- Significant easing of the compilation burden on our computer mainframe, making more time available for other processing.
- Increased productivity of our programming staff because of greatly improved turnaround.
- Ability to defer investment in a larger mainframe, since the benefits accrue mostly to the prime shift.

We feel this product can be of significant value to many installations since the compilation and linking of programs normally consumes a large percentage of monthly computer mainframe utilization.

Toward this end, we have entered into an agreement with Odyssey Systems, Inc. to market and support OP/C on a worldwide basis.

McCormack is president of McCormack & Dodge in Newton Upper Falls, Mass. Odyssey Systems is in Cambridge, Mass.

Datasystems Get English Subset

TAMPA, Fla. — Described as a subset of the "English" language developed by Microdata Corp. for its Reality systems, English for the Digital Equipment Corp. Datasystems 350 and 500 is a generalized information management and data retrieval language, according to the vendor, Business Information Systems, Inc.

A typical English inquiry consists of verbs, file name, field name, data selection criteria and a display format. Each user's vocabulary can be tailored to his particular application, a spokesman claimed.

In addition to more than a dozen verbs and phrases used to structure queries, English also supports a dozen verbs to create, modify and list or print the data dictionary that drives the system. The dictionary consists of file and field names; field types, sizes and positions; display formats; and header descriptions for reports.

Preexisting Dibol files can be listed in the dictionary and utilized by the English facilities, the spokesman said, adding that the software is available under license for $1,000. The company can be reached through P.O. Box 22065, Tampa, Fla. 33622.

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Not So Mini Anymore — Part 3

On-Line Coding Easier Than on Mainframe

By Michael B. Resnicow
Special to CW

Minicomputers in the commercial environment are tackling more and more data processing jobs traditionally given mainframes — jobs for which minis were not even considered in the past.

For example, a large paper manufacturer is considering buying a 32-bit mini to be used exclusively for program development. The systems and programming manager is planning to transfer the majority of the company's Cobol program development and testing to the minicomputer.

The reason for this move is sound: Business management no longer accepts the fact that turnaround time for a single program update, compile and test must involve an uncontrollable span of hours, or even days. Production jobs have always come first and testing and compiles were allocated to whatever time was left.

It, wasn't until mainframe computers moved away from the fixed regions toward variable partitions and multitasking that on-line program development began to appear in the business DP community.

Both mainframe and minicomputer software permit the use of multiple terminals for on-line program development, initiate and monitor the progress of batch jobs and offer teleprocessing facilities — concurrently, in a multitasking mode.

Interactive program development is made possible by sharing system resources. Since the majority of this work is I/O bound, the processor is free most of the time. Concurrent resource sharing increases system utilization and productivity as program development overlaps production.

Using minicomputers for interactive program development provides the user the same sophisticated facilities available with some of today's mainframe software packages. Focusing on ease of use for programmer and terminal operator, mini software strives to make the environment transparent to the end user.

At the same time, security features are not overlooked. Password protection for terminals limits unauthorized access, while file management recognizes the need for private, group and system files.

Interactive development capabilities can be as simple as an on-line text editor, or as comprehensive as a complete source-program editing, updating and testing facility that provides access to every system resource.

It may include intertask communication enabling the terminal user to maintain simultaneous control over batch jobs in the system. But fundamental to any of these systems

(Continued on Page 40)

Free Booklet Reviews Study

PENNSAUKEN, N.J. — DP expenditures, personnel and the functions of DP management are a few of the subjects discussed in a free portfolio recently released by Auerbach Publishers, Inc.

The booklet, *Now That You've Told Us . . .*, is based on the results of a survey of 225 DP executives whose companies have gross annual sales ranging from $100,000 to $7 billion, a spokesman said. Opinions as well as specific facts are offered on topics ranging from distributed DP to future industry-related challenges.

The booklet is available from Auerbach, Department 101, 6560 N. Park Drive, Pennsauken, N.J. 08109.

Most engineers and scientists will find all the power they need in this new leader of the HP 1000 family. A new floating point processor handles big data arrays and cuts lengthy computational problems down to size. And the HP 1000 Model 45 also has the flexibility for complex measurement and control applications, for data base management and distributed networking.

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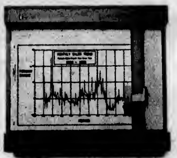
The HP 1000 Model 45 comes with a fast (25 msec seek time) 20M byte disc drive and an HP 2648A Graphics Terminal, as well as our new Graphics/1000 support software to help you write graphics programs. You can also team it up with other HP products like the HP 9872A four-color plotter and the HP 7245A printer/plotter.

Adding data base management is as simple and economical as adding peripherals. Our IMAGE/1000 software will consolidate your technical information into related and easily accessible files. And you can pool data from other HP 1000 systems (as well as linking to our powerful HP 3000 general purpose computers and IBM) with the help of DS/1000 networking software.



In addition to getting graphic displays on the 2648A terminal, you can get hard copy graphics on our new 9872A programmable four-color plotter, one of many options available with the HP 1000 Model 45. It has a built-in microprocessor and operates up to 360 mm/s (14 inches/s) on each axis. Ideal for vector analysis trace differentiations and window plotting.

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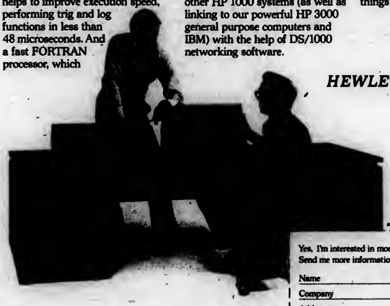

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Getting Down to Basic

DEERFIELD, Mass. — Overcoming "computer anxiety" while providing an introduction to Basic is the goal of a book published here by Deerfield Academy.

Basic Computing: An Introduction to Programming in Basic was written by Robert Hammond under the direction of a faculty/student computer advisory committee at the academy. The book is said to be aimed at two types of students: those eager to learn how to use the computer but who "just don't know where to begin and those with computer assignments they want to "get out of the way as quickly and as painlessly as possible."

The book takes the reader through several simple programs and in the process covers debugging, line numbers and spaces, block inputs, loops, subscripted variables and various command statements, a spokesman said.

The 43-page manual was written specifically for the Digital Equipment Corp. PDP-11 using RSTS/E but can serve most beginners, the spokesman pointed out.

The books cost $1.75 each for one to 19 copies, he said from the Academy at Deerfield, Mass. 01342.

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Software Now Running on Minis Eases On-Line Development

(Continued from Page 39)

is good, terminal monitoring software. These multiterminal monitors usually have manufacturer-imposed limitations of 16, 20 or 64 terminals. Typically, these are not hardware constraints, but limitations based upon the markets served by the products.

Autonomous Operation

Protection features allow for private files, accessible only to a specific terminal. Groups of users can be defined and file access can be similarly limited to terminals within a predefined group. Files set up as system files are accessible to be read by every terminal.

A good terminal monitor provides the programmer with complete independence from other on-line users and freedom from interference by others. A complete program development environment is furnished. All necessary system resources and services are accessible, and a multiaccess setting for communicating with a CRT or printer terminal is supplied.

Reentrant text editors perform text manipulation, conserving system development resources. The better development systems available allow the user to page forward and backward easily — random editing allows the programmer a high degree of freedom.

Multiprogramming is available with minicomputer program development packages, too. For example, our own multiterminal monitor, the Interdata OS/32 MTM, provides concurrent support for all language processors. Each user can perform program development in Cobol, Fortran, Basic or Assembly, using the language best suited to his application, with total independence from other terminal users.

Spooling Aids Throughput

Any on-line system is dependent on the speed of I/O devices. Tasks should never have to wait for slow devices. Spoolers assure this by providing spooling to disk files.

Input spooling features permit copying batch streams, such as source program cards, operator commands, job control procedures or other data needed by the user for immediate or subsequent processing.

Program output to be printed is temporarily written to disk. It is later copied by the spooler when the assigned printer is available. Spooling output means more than one task may be assigned simultaneously to one or more printers or printer terminals, without interference.

To improve interaction, command sets are furnished for the terminal operator. Designed for the novice, meaningful, . full-English-word commands can also be abbreviated to short mnemonics by experienced programmers.

More than a single job control language, commands issued by terminal operators control the loading and starting of tasks, the allocation or assignment of files and system interrogation to display files or list users. The commands also furnish controls for submitting or inquiring about the status of batch processes.

These commands are powerful sets of interactive JCL which effect considerable savings in time and effort. Complex operations can be carried out using a small number of commands.

The user has the ability to catalog files of dynamically modifiable commands which can be called from the terminal and executed in a defined sequence. Command sequence files are created and maintained from the terminal.

Resnicow is a software product specialist at Interdata.

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Courier Matches IBM 3274, 3276, 3278

PHOENIX — ITT Courier Terminal Systems, Inc. has introduced a series of controllers and CRTs it claimed are comparable to IBM 3274, 3276 and 3278 units but offer users savings that range up to 30%. The 3278-compatible CRT has screen capacities of 2,560 and 3,440 characters, matching IBM.

The Advanced Terminal Controllers (ATC) are compatible with IBM 3274 and 3276 controllers; the 3274-type unit supports a combination of 32 CRTs and printers and the 3276-compatible controller supports eight, although at least one CRT is required, Courier said.

The 3274-type controller comes in three models, the 7411-A, 7411-B and the 7411-C. The first operates under IBM's Synchronous Data Link Control (SDLC), the second can be used with IBM 3272 protocol and the 7411-C operates either under Binary Synchronous Communications (BSC) or SDLC.

The 3276-compatible controllers are the 7601-0, which is the BSC version, and the 7601-1, the SDLC model.

Self-Test Ability

The ATCs include self-test capabilities for fault isolation and correction, according to Courier. They also have an Attribute Reveal feature by which formatted screen attribute bytes can be displayed to aid in program development.

A Line Channel Capture capability allows the operator to display line and channel traffic on the CRT for network troubleshooting, a spokesman noted.

The controllers are "functionally and operationally compatible with similar IBM controllers, CRTs and printers," he added.

The Courier systems can be used in either local or remote configurations to replace IBM terminal systems, but IBM controllers cannot be used with Courier CRTs and printers. The one exception to the need for all-Courier systems is in the case of a remote automated teller machine which cannot connect to an IBM 3791 controller at a remote site.

A 3274-compatible local mode system with 10 1,920-character CRTs and two 120 char./sec printers costs $45,000; the same system from IBM would cost $61,000 according to Courier.

An IBM two-year lease on this system would be $1,450/mo while the Courier system on a three-year lease is $1,150/mo.

A small remote clustered system with seven CRTs and one printer would cost $24,000 from Courier compared with $33,000 from IBM. The two-year IBM lease price would be $750/mo vs. $650/mo from Courier.

First deliveries of the Courier units are scheduled for late 1978. The vendor can be reached at Box 29039, Phoenix, Ariz. 85038.

Sita Network, System/7 Keep Spare Airplane Parts Flowing

E. HARTFORD, Conn. — The Pratt & Whitney Aircraft Group of United Technologies Corp. has reported improved delivery of spare parts to its airlines customers with a terminal network.

The time-saving system allows operators of remote terminals at 41 overseas and 14 domestic airlines to order engine parts and retrieve shipment information directly using mainframes at Information Systems Data Center here.

The network, supported by an IBM System/7, handles the entire parts purchasing procedure, from initial order through shipment, often saving five to 14 days compared with the previous manual operations. The result is smoother parts supply — assuring that planes are kept operational — and a reduction in cost of ownership of Pratt & Whitney engines, according to Frank T. Sprogell, vice-president of product support in the Commercial Products Division.

Administering the flow of replacement parts from order to shipment is complicated, requiring management of an inventory of more than 35,000 part items for about 18,000 engines on 4,100 commercial jets operating throughout the world.

"Managing this inventory and responding to order inquiries from our airline customers is obviously a difficult task," John Telegener, manager of commercial spare parts sales, noted, "but it was made even more difficult by the length of the order pipeline. For example, we are responding to airlines' requests to expedite shipment of their parts

(Continued on Page 42)

Independence Up Front — Part 2

Processor Backs Expansion Plans

Special to CW

SAN FRANCISCO — The communications processor used by Levi Strauss & Co is now handling all data transmission and data collection between Levi's headquarters and its four distribution centers. The one installed at the headquarters DP. center here provides network control; a second is in Amarillo, Texas, the site of one of the four centers, all IBM, environments.

Chosen after a year-long study, the Computer Communications, Inc. (CCI) CC-80 has a 16-bit minicomputer with 128 hardware registers as the central controller. The central controller exercises supervisory control over the network. A separate I/O processor, as powerful as the central controller, is handled by the central controller's main memory and can handle up to seven host computers:

The system also has a bisynchronous controller interfaced to the central controller which handles the full duplex bisynchronous lines. The CC-80's memory bus handles up to 64 8K memory banks and a character I/O bus is used for line adapters to terminals.

A large IBM user describes how an independent front-end processor operates in a large corporate network. Last week, in the first half of this series, the selection criteria for the front end were detailed.

There is virtually no limit to the number of terminals that can be integrated into the system, its vendor claimed.

Besides being able to handle up to seven host computers, the system features a

(Continued on Page 42)

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International Net Keeps Spare Parts Flowing

(Continued from Page 41)

only to find that the parts already were en route. Manually searching for answers to these inquiries was a time-consuming process.

Two Systems

"With the assistance of two round-the-clock computerized systems, new parts orders are now received and processed immediately," Telgener said. "Our customers are also kept informed about order status in a timely and effective manner via these automated systems."

The first system, the Customer Order Data Exchange (Code), provides a communications link between Pratt & Whitney and its customers through an existing telecommunications network called Societe Internationale Telecommunications Aeronautique (Sita). Sita is run jointly by 150 airlines.

With the Code system, an airline operator using a keyboard terminal on any continent can enter a purchase order directly into a series of IBM computers at Pratt & Whitney headquarters.

Domestic airlines transmit data to Pratt & Whitney's IBM 1050 keyboard/card entry terminals through Wats telephone lines at a rate of 2,400 bit/sec. Overseas, airlines send and receive information in batch mode on the Sita network via a full-duplex synchronous link with a proprietary protocol to the Sita switching center on Long Island, N.Y.

Messages come into the Pratt & Whitney System/7, which can switch certain messages directly to an MVS system consisting of two IBM 370/168s. Besides this on-line, real-time function, the System/7 stores orders on a disk subsystem, and twice daily the orders are sent to the CPU for processing.

In addition to order entry, administrative messages such as order status inquiries or changes in scheduled delivery may be sent by the airlines and responded to through the same Code system.

Communications with the computers continue around the clock. In a completely automated operation, approximately 30,000 part items are ordered monthly and channeled for processing by Pratt & Whitney's other recently modernized computer system — the Commercial Order Processing System (Cops). This system automatically enters the order into the company's records, performs a technical review to determine part number validity, surveys current inventory for availability and schedules the order.

Cops also allocates parts from inventory and generates the paperwork required to fill the order. When the material has been pulled from inventory, packaged and shipped — with each operation recorded in the computer — Cops automatically generates invoices for customer billing and communicates via the Code system to advise the airline customer of shipment.

Two Front Ends Support Levi's Net Expansion Plans

(Continued from Page 41)

throughput rate of 300,000 char./sec in synchronous mode. It has multiprocessor features so more than one processor can work in conjunction as a single system.

The CC-80 is a task-oriented system and the user can put co-resident tasks into the system. Disk storage gives each node in the system buffer capabilities and the facility for such functions as on-line diagnostics, network routing and queuing of data.

The key to the CC-80 is its network control system (NCS) software package, a four-part program. The first, the NCS-1 Basic Communications System, is a disk-based, real-time communications system that allows interfacing to a variety of communications terminals and local and remote peripheral devices.

The features of NCS-2 Network Communicatons System and NCS-3 Network Control Program (NCP) Emulation System are extensions of NCS-1 for network interface and management plus independent line control. NCS-2 provides Levi's with modified IBM 270X control unit emulation in which all line control is performed by the CC-80.

The NCS-4 Remote Communications System provides Levi's with line control for terminal operation and remote concentration. It supports activities for front-end processing at each company distribution center and is expected to support the proposed voice communications network and specialized subnetworks such as message switching and word processing.

A network supervisory capability is built into the system. A CRT located at the network control node can be used to change the network or other reconfigurations that are required. Diagnostics are built into each link.

The system features full front-end line control. Each node can control up to 240 lines. Error recovery and network recovery are also part of the system. The host computer is not exposed to bad data.

Networking and message switching can be co-resident within the system, allowing one terminal to communicate with another terminal without going through the host computer. Data can be stored within the system in the event a specific terminal is off-line.

Network Plan

In reviewing the data communications network at Levi's, Joseph Reuss, corporate director of telecommunications, explained that the next step would be to complete installing CC-80 front-end processors at each distribution center. "This will expand our present system so we can have interactive communications between any single point within the network," he said.

Other plans include installing terminals at the more than 70 manufacturing plants across the U.S.

"This will be the second major step in building our network. We will then be able to accumulate data from manufacturing, handle message switching between plants and begin initiation of voice communications," Reuss said.

As soon as the data communications traffic reaches a level where satellite communications are cost-effective, Reuss said, Levi's will lease a channel. "Then, an additional responsibility of our network control system will be to keep the channel full so that we can maximize its usage," he noted.

The final stage of the Levi's network, expected to be completed by 1980, is the installation of CC-80 processors at foreign locations.

"Today, we are building a network that is expected to meet our data communications needs for the 1980s. The technology is here and it is only a matter of putting it to use in the most effective way," Reuss said.

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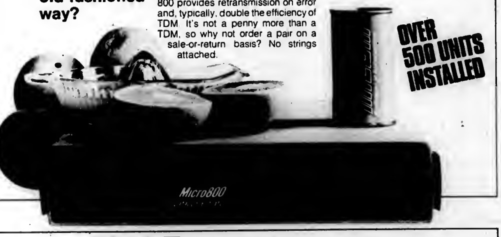

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For Supermarket Applications

IBM Units Permit Customized Checkouts

WHITE PLAINS, N.Y. — Programmable terminals and controllers that allow supermarkets to customize checkout operations and in-store reports have been announced by IBM.

Two models of the supermarket terminal can use either IBM program products or user-written programming executed through programmable versions of the IBM 3651 store controller, according to a spokesman, who said this permits management to tailor terminal functions to the requirements of individual stores.

For example, methods of handling coupon and food stamp transactions can be modified from store to store, as well as the form and content of sales reports.

The terminals help stores modify existing applications or add new ones — such as automatic reordering and delivery of stock. The supermarket terminals can also provide some basic checkout functions if store controller support is interrupted, the spokesman said.

Two Memory Sizes

The IBM 3663 models 1P and 3P programmable terminals feature a maximum memory of 48K and 32K characters, respectively. Other features include a 10-key numeric pad, 34 data entry function keys, an alphanumeric printer for separate customer receipts and store tapes and a removable cash drawer with a key-lockable till, the firm stated. CRT panel with a capacity of 22 characters is also standard.

Optional features include adapters for attaching IBM scanners to read the Universal Product Code (UPC) on products. An optional document-handling feature permits check endorsement, and adapters allow stores to attach compatible electronic scales and coin dispensers, IBM said.

Two programmable models of the IBM 3651 store controller, available in several memory sizes, support the terminals. Controller functions include storing data and executing programs as well as supervising communications with the host computer, other store controllers and attached terminals.

The Model 25 controller features up to 76K characters of memory and one communications loop for attaching terminals. The Model 75's maximum memory controller is 124K characters of information with two communication loops standard, one optional.

IBM also announced three program products for the programmable terminals and controllers. The application software packages can be user-modified for greater versatility, the firm claimed.

The three program products are the point-of-sale (POS) Application/Supermarket Environment, the POS Application/Report Customizer and the Subsystem Program Preparation Support II.

Purchase Prices

Purchase prices for the IBM 3663 models 1P and 3P are $6,450 and $2,980, respectively. The terminals can be leased for a five-year contract for $204/mo and $98/mo.

Purchase prices for the IBM 3651 controllers range from $19,000 to $22,000 for the Model 25 and $26,500 to $58,340 for the Model 75, depending on configuration. The controllers can be leased for a two-year contract period, with monthly charges ranging from $635 to $735 for the Model 25 and $742 to $1,600 for the Model 75.

Monthly license fees for the three program products are $35 for the POS Application/Supermarket Environment; $6 for the POS Application/Report Customizer; $260 for the Subsystem Program Preparation Support II.

The products and programming will be available in June 1979.

PDP-11 Minis Get Line Switch

LITTLETON, Mass. — A multiple-channel, general-purpose serial communication line switch for use in redundant processor applications has been introduced by Pichler Associates.

The Pichler TS01 is a rack-mountable, 16-channel terminal switch that functions as a 32-pole, doublethrow reed relay switch controlled by primary or secondary processors, the firm said. In manual mode, it is controlled by front-panel switches.

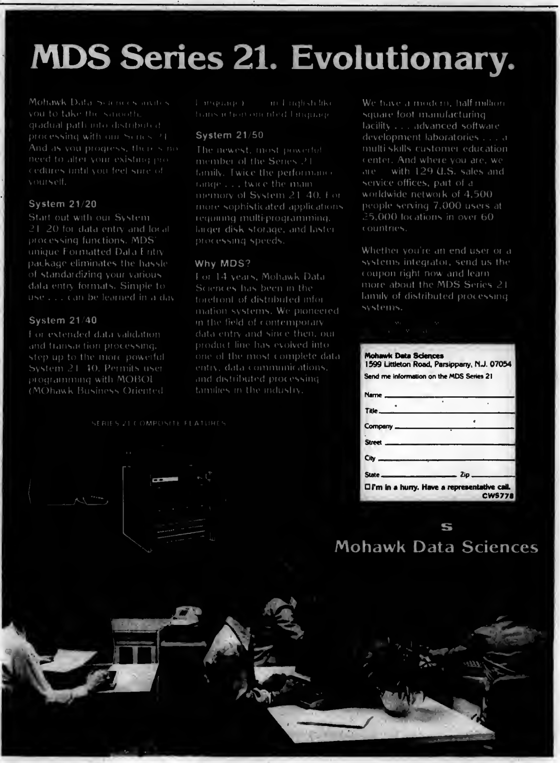
The TS01 is mainly addressed to the Digital Equipment Corp. PDP-11 minicomputer series, the firm noted.

Control Switch Feature

Manual and automatic control switches have redundant contacts, and all critical signals employ redundant pins, the firm said. At initialization or loss of power, the switch reverts to the primary processor.

The self-contained TS01 unit is said to use dry reed true form C relays throughout, incorporating all power and cable connections.

The TS01 costs $995, with OEM discounts offered. Pichler Associates is at 410 Great Road, Littleton, Mass. 01460.



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WU Takes 18% Off Price of EDT 1232

MAHWAH, N.J. — Western Union (WU) Data Services Co. has reduced the purchase prices for its EDT 1232 teleprinter up to 18%.

The outright purchase price for the EDT 1232 keyboard send/receive (KSR) version, which had been $4,775, has been reduced to $3,900; the EDT 1232 receive-only (RO) unit, which had been $4,600, has been reduced to $3,775.

These prices do not include shipping charges, but quantity discounts are available, WU noted.

The EDT 1232 offers 120 char./sec throughput; 132 print positions and both front and rear loading of up to six-ply paper.

The printer's 1,024-character closed loop buffer automatically signals the user's CPU to stop transmission when filled, avoiding loss of data and signals when ready for more data, WU said.

The device comes in a large number of terminal arrangements. For preparation, editing and local storage of high-volume data, the EDT 1232 KSR with its Smarts controller and floppy disk unit is available.

For low-volume applications, the EDT 1232 features a magnetic tape cassette buffer; more than 100 options are offered.

A full service maintenance contract costs $50/mo for the EDT 1232 KSR and $47/mo for the EDT 1232 RO. Maintenance is provided by the company's Termicare customer-support service.

WU Data Services is at 70 McKee Drive, Mahwah, N.J. 07430.

General Datacomm Modem Operates at 300 Bit/Sec

DANBURY, Conn. — An asynchronous LSI modem for point-to-point or multipoint private-line operation has been announced by General Datacomm Industries, Inc.

The GDC 108-3 transmits data at 300 bit/sec and operates in either answer or originate mode, full-duplex over two- or four-wire lines. The mode is selected via a reversible plug, the firm said.

The modem also features built-in diagnostics, external mode selection and compatibility with Bell System products, a spokesman said. The GDC 108-3 provides switch controls and LED indicators.

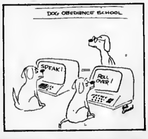
In either stand-alone or rack-mounted configurations, the GDC 108-3 costs $315, General Datacomm said from 1 Kennedy Ave., Danbury, Conn. 06810.

Hazeltine Adds OEM Terminal

GREENLAWN, N.Y. — A microprocessor-based OEM teletypewriter-compatible terminal has been added to Hazeltine Corp.'s family of CRT terminals.

The Model 1400 is capable of either local or remote connection through an RS-232 interface at switch-selectable transmission rates up to 9,600 bit/sec.

The Model 1400 costs less than $550 in quantities of 1,000 or more, the firm said from Greenlawn, N.Y. 11740.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Amdahl Chairman Says:

Micros Expanding Large System Uses

By Howard A. Karten
CW Staff

NEW YORK — "The biggest driver for [continued business growth in] the large end of computer systems is microprocessors, because they make available a whole host of new applications," according to Dr. Gene Amdahl, chairman of the board of the Sunnyvale, Calif., company that bears his name.

Saying that microprocessors were responsible for much of the growth he has seen in the large-scale systems market — the market in which his company specializes — Amdahl cited as a future possibility inexpensive collection of sales data at gas stations. Prior to the widespread availability of microprocessors, such data collection was not worth the cost involved in gathering the information. However, it will become less and less expensive to collect detailed data for statistical analysis and more and more computer power will be required to analyze and use this data.

Speaking before a heavily attended executive briefing here, Amdahl noted that most computer applications require the integration of a human being in the data collection process or require low cost and flexibility. Microprocessors can meet these needs by casting a wider net, and making economical tasks which were not feasible before.

Amdahl said "the number one rule" of his company, founded in 1970, is to "maneuver equally with IBM." However, responding to a question about whether the company would market an operating system in the near future, he said "that would be one of the biggest mistakes we could make."

Amdahl, the chief architect of the IBM 360, responded to questions on a wide variety of topics, ranging from business strategies to IBM machine instructions to problems of large-scale integration.

Program Maintenance

Noting that "close to 75% of all programmers are involved in maintenance activities," Amdahl made a veiled reference to "tools and disciplines" the company is investigating (and possibly planning to market) in order to facilitate these maintenance activities. The software changes he referred to are not simply error correction or forms redesign, but "related to the changes that occur in the business environment" — that is, changes in the law and business practices necessitate program alterations. "We may be able to assist" in updating software, he said somewhat cryptically.

Amdahl noted that IBM used a system called "machine analyzer" to assist in determining how to charge for individual models in the 360 and 370 lines. Roughly speaking, each step up within a series gave customers a three-fold performance increase, accompanied by a doubling of price, Amdahl noted.

Prices to customers were determined as a function of the system's performance, he noted. By contrast, Amdahl said he saw greater opportunity if products did not have to be priced relative to other products in the same line.

Amdahl said his company, which claims to

(Continued on Page 48)

Mail Order System Keeps Firm Afloat During Seasonal Deluge

Special to CW

MONROE, Wis. — Although business at The Swiss Colony, Inc. is good all year, it peaks during the six weeks from Nov. 1 to mid-December, when the company does 80% of its business and is forced to expand its work force from a normal 400 to 2,400 employees.

"Things get really hectic during that period," according to Ray Kubly Jr., president of the mail order company that sells fine cheeses and foodstuffs. "We get hundreds of thousands of orders for our gift packs, all of which must be delivered to recipients in time for Christmas. We need all the help we can get to handle the heavy daily workloads."

To help meet its needs during this and other periods, the company turned to a computer-based mail order processing system (MOP). Run on an IBM 370 Model 145, the system is driven by 30 IBM 3277 terminals that speed order entry and processing, track every order from receipt to shipment and make available, instantly, the current status of every order..

Terminals are located in production scheduling, credit authorization, order entry, warehouse and customer service departments, and the system is involved in virtually every facet of the mail order operation, from credit authorization to warehouse outload.

"MOP was designed to ensure the best possible service to customers," Jim Bybee, vice-president and general manager of the data center, said. "It offers bonus benefits such as greater efficiency, higher productivity and lower costs. But the important payoff is better customer service."

The problem of a heavy concentration of business is compounded by the nature of the mail order gift business, in which one order might call for several different gift packs for several different recipients.

Credit Control

In addition, authorization of credit card purchases, which the company encourages, and checking the credit limits of regular customers are complex procedures. Credit control must be tight and effective, but cannot be allowed to unduly delay order processing.

To meet this aspect of the problem, the company generates a separate tape file for each credit card organization and transmits

(Continued on Page 50)

Town Cuts File Update Costs

Special to CW

STETTLER, Alta. — By consulting a CRT in the town offices, town clerks here can learn the current status of accounts receivable for any utility, business tax or property tax account. To the clerks — who see balances change immediately when they enter credits or adjustments through their terminal — it is immaterial that the accounts receivable master files are actually updated only once a month.

"With our software, the user would think the accounts receivable master files were updated nightly," according to Ken Moseley, president of Western Computing, Ltd., a service bureau and NCR Corp.-certified software house in Edmonton, Alberta. "But costly daily update routines aren't necessary with our inquiry program.

"The inquiry program is written to pull information from two files," he explained. "From the master file, it picks up static descriptive information plus the previous balance. From the pending transaction file, it accesses all of the transactions that have taken place since the previous update. The combined up-to-the-minute result is what the user sees on the screen."

Speaking at the NCR Users Conference (Nucon '78) held recently in New Orleans, Moseley described the advantages of the software, written by his firm and marketed by NCR Corp.

The family of software includes financial, utility and property and business tax systems that can be used in a stand-alone mode or linked together through the general ledger.

Among the operating benefits Moseley at-

(Continued on Page 51)

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Band Line Printers Run At 75- to 600 Line/Min

MALDEN, Mass. — Data Printer Corp. has introduced a series of microprocessor-controlled, band line printers capable of printing at speeds from 75- to 600 line/min.

The Series 3000 features a single line advance time of 25 msec and a slew speed of 15 in./sec for all four models in the series. Inking is performed by a "clean hands" operator-replaceable cassette.

The members of the series — the 3600, 3300, 3150 and 3075 (last three digits indicate line speed/min) all include an RS-232 interface, 132 print positions (136 optional) and the ability to print one original plus five carbonned pin-feed forms, at 6- or 8 line/in.

Character sets offered on the series include two different 64-char. sets as well as a 48-, 96- and 128-char. set. The character element is a lightweight, single-piece, operator-changeable band.

In units of 100, the Model 3075 costs $2,875; the 3150, $3,075; the 3300, $3,345; and the 3600, $4,565, from the company at 99 Middlesex Ave., Malden, Mass. 02148.

Large Systems Getting Micro Boost: Amdahl

(Continued from Page 45)

have more than 150 systems installed, still maintains a "lead" in the industry, and he forecast an increased lead position in the future.

Calling IBM's MVS "probably the most significant piece of software" available today, the soft-spoken board chairman said future hardware will mainly have to be compatible with systems software, adding that the widely discussed possibility of moving operating systems into microcode will probably not happen.

Enormous Job

"Microcode cannot be used in an optimum way, and software cannot be moved into microcode. The IBM 3033 microcode couldn't accept a single MVS module," and it would take an enormous amount of microcode to accept the entire operating system, he said.

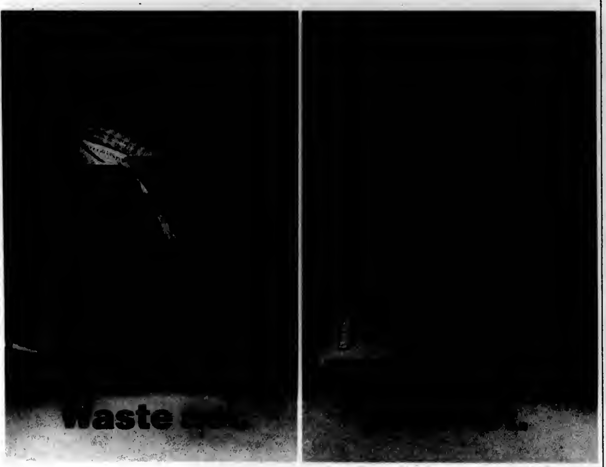
Amdahl also made a number of technological predictions. Virtual addressing, not very effective at present, will improve and have greater value in the future. In addition, air circulation (as opposed to water cooling) will remain as a method of eliminating excess heat from computer systems, and higher levels of integration will reduce heat problems, he predicted.

He also noted that "the semiconductor is probably the device of the future, at least for the next decade" and said gates will probably not be supplanted by bubble memories and other recent breakthroughs.

System Evolution

Addressing the area of evolution, Amdahl noted that IBM is constrained from making a revolutionary change by customers, who, with an estimated $200 billion investment in software and hardware, "would scream" if the mainframe giant tried to create another revolution in computers. Nevertheless, the architecture of IBM systems — which have created a defacto standard — will probably continue to evolve "one piece at a time."

In response to other questions at the meeting, Amdahl said his company strives to help its customers as much as it can. A company rule requires customer engineers to call headquarters if they cannot diagnose a customer's problem within an hour, he noted. At that point, a specialized system at the company's headquarters and a minicomputer built into every Amdahl system can be used to aid in problem determination.



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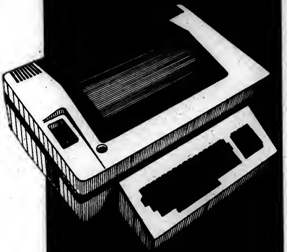

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Tape Cleaner/Rewinder Unveiled

BURLINGTON, Mass. — Computer-Link Corp. has introduced a magnetic tape cleaner/rewinder that can detect physical damage in a tape without erasing any recorded information. The company claims this is the first product of its kind that will not alter taped data.

The Model 1011 cleaner will find holes in the tape, damaged edges, nicks, oxide voids, scratches, wrinkles or cinches in the tape as small as .5 mm in size, according to a company spokesman. In addition, the cleaner — which is said to clean each tape twice — will retension the tape for precise rewinding and packing onto a reel or cartridge.

A company spokesman compared the process, which stops when the unit encounters a defect, to brushing one's teeth, suggesting that a regular program of tape inspection is superior to merely inspecting a tape annually or semiannually.

The Model 1011 sells for $3,250 from the company at 14 Cambridge St., Burlington, Mass. 01803.

System Keeps Orders Up to Date

(Continued from Page 45)

that data to the appropriate verification center for authorization. "As far as we know, this is the first system to perform this automatic credit authorization function," Bybee noted.

Other complications include obvious inventory problems of ensuring product availability to fill incoming orders and the need for swift, positive back-order follow up. Another troublesome chore is assembling and staging single and multiple orders for bulk delivery by truck to a vast number of post offices and United Parcel Service facility destinations.

The system also assists in getting the right gift pack to the right person at the right time. Additionally, it is essential that the recipient be correctly informed of who sent the gift. It all adds up to a logistical nightmare in a pressure-cooker atmosphere.

"That's why we built such a diversity of functions into the system," Bybee observed. "It has to do a lot of things in a big hurry without making mistakes."

Order processing begins with the microfilming of all incoming orders. The mircrofilming device automatically assigns a sequential identification number to each order for security purposes, and the microfilmed orders are then batch for input. Data entry is performed by typing coded data onto "scan" forms using IBM selectric typewriters with an optical character recognition (OCR) font.

The forms are read with OCR scanners and edited by MOP, which checks the validity of Zip Codes, customer order numbers, product codes and other vital data. For each order read, MOP sets up a record detailing the order data such as customer, date, recipient and requested delivery date.

The system tracks each order, under the assigned ID number, through all subsequent processing stages to shipment, when the record is updated to reflect the date and method of shipment.

Picking, Packing Schedules

As part of the initial processing, the system time-slots the orders for picking and packing at the proper time to meet scheduled delivery dates. It also produces the "greetings" that will accompany each gift pack, naming the donor and describing the delicacies delivered. If an order is delayed in processing or is received too late for delivery before Christmas, the system sends an advance "greeting" explaining to the recipient that a gift is on its way. It describes the gift, names the donor and gives the approximate date the gift will arrive.

The system also captures sales statistics by customer, product item and gift pack type, size and price. Before releasing the orders for filling by the warehouse, the system checks inventory availability. Inventory transaction and stock status records, now updated daily with a batch run, soon will be integrated into the on-line system for even more dynamic availability checking and back-order control.

Before releasing orders to the warehouse on the time-slotted schedule, the system produces the picking tickets that spell out the location of each item and prints all required shipping labels. These labels — which exceed 100,000 a day during peak order season — also control the assembly and staging of order groups and the number and mix of orders going into each of 10 refrigerated truck trailers that haul shipments to transportation facilities each day.

Summing up the value of the system to the company, Bybee said, "If a customer inquires, we can immediately determine the status and details of his order using the terminal. If a customer wants to change any aspect of his order after it has been placed, we can handle the changes. In short, the system maximizes the customer's control over his gift order from the time he sends it in until the time we ship it out."

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Service Helps Town Reduce File Update Costs

(Continued from Page 45)

tributed to the software are the elimination of costly daily master file updating, one-time data entry, the ability to keep subledgers and general ledger in balance at all times, improved backup and data security and greater flexibility for service bureaus handling multiple, varied accounts.

To illustrate these advantages, Moseley described the use of the software by Custom Data Processing, Ltd., the local firm that services the city's accounts as well as other business customers. The town generates tax bills for approximately 2,000 properties and serves about 1,700 utility customers.

The service bureau uses a 96K NCR Criterion 8200 with three NCR 796 terminals attached. Two of these are used for data entry to batch work files in the offices of the service bureau, while the third, located in the town office, is used to enter credits, adjustments and other data. Input also comes from a cassette in the town's NCR 250 cash register that captures transactions off-line for input later.

Batch File Advantages

Moseley believes the batch work file concept has several advantages. "It gives operators greater flexibility," he said. "If there is an interruption — as there frequently is in a service bureau environment — the operator can simply shut down the CRT and switch to another job or handle the crisis. Then, the operator can come back and start the posting at the point of interruption with no harm done.

"The batch work file cannot be released to the pending transaction file until it is balanced and edited and account numbers have been verified against the master files," he said.

Financial Pending Transaction File

Once the batch has been edited and balanced, it is released to the financial pending transaction file. In Stettler, this file is shared by all 200 customers served by the bureau. Moseley told the audience he knew of no limits on the number of accounts that can share this file.

Since the inquiry program that accesses the pending and master files eliminates the need for daily updating of the master file, the information remains in the pending file until it is time for a monthly update.

"The automatic interface between the systems means that data only needs to be entered one time and assures that the subledgers and general ledger are always in balance," Moseley said. "For example, all utility charges, meter deposits and receivables are automatically posted to the appropriate general ledger revenue and receivable accounts during updating."

Single Customer Request

A request from one customer for a financial report or detailed general ledger before the master files are due to be updated does not require a master file update for all customers, Moseley added.

"Just the one master file is updated," he said, "and that customer's pending transactions are flagged. Then, the transactions can't be entered a second time when the general updating is done for all clients."

Backup and security were major concerns when the software was developed, Moseley said.

"When we do our update routines, the first step is recreation of the master file. Then, if there is a system failure, the master file can be called up again with no data lost. If we were updating on a daily basis, this file copying would require a considerable amount of computer time.

Security Provided

"Our procedures provide the needed security and yet minimize computer processing time. Since the update routines are identical for all systems and information can be shared for different files, less computer memory is required to handle the same number of applications."

Moseley said Western Computing, Ltd., developed the batch work file and pending transaction file concepts while writing software for NCR Century systems.

The system closely resembles the earlier NCR Century financial system currently being used by "hundreds of clients," in Canada, he said.

"Developing software for the NCR Criterion 8200 and 8250 has been easier than it was for NCR Century," Moseley said. "With a flexible configuration and an interactive system, we have had greater freedom. Though they cost about 30% as much as their predecessors, the Criterions are far more flexible."

Desktop Burster Offered by NCR

DAYTON, Ohio — NCR Corp. has announced a desktop forms burster for single-sheet, continuous computer forms, intended primarily for lower volume operations.

The NCR 6305 Mini-burster can accommodate a range of paper weights and form sizes, according to the company, and operates at 82 ft/min or 125 fit/min.

Forms width can range up to 14-7/8 in. and length can vary from 2.5 in. to 12 in.

The unit is priced at $1,250 from the company in Dayton, Ohio.

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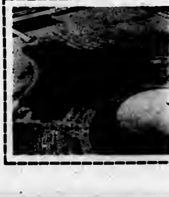

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Supplier Learns Woes of Head Crashes

By Marguerite Zientara
CW Staff

HOUSTON — "When you hear of head crashes, my understanding is that they are freak occurrences. Here I had three in less than a year, and I was completely twisted out of shape about it."

That's how David Buvinghausen, vice-president of Central Supply Co., Inc. described the problems he encountered shortly after installing a computerized inventory control system configured by Citation Computers, Inc. here.

Central Supply is a distributor of appliance parts for commercial and residential heating and air-conditioning equipment. Its customers include contractors, service and repair people and owners who buy the parts when they are needed — "which frequently means they are working under tight job schedules," Buvinghausen noted.

Because these customers need to know immediately if a part is available and when it can be picked up or delivered, Central Supply required a control system that would keep that information current at all times.

From its original Cardex manual system, Central Supply switched to a service bureau in late 1974. The service bureau proved unsatisfactory, however, because "we weren't getting enough control. It had a two-week update that wasn't doing us much good. In fact, we found we'd been better off with the Cardex system," Buvinghausen said.

'Basic Trust' in New Vendor

After evaluating an NCR Corp. Spirit 8200 system, a Basic Four Corp. system and "a couple of others," Buvinghausen chose Citation's configuration consisting of a 32k-byte Century Computer, Inc. Model 400 CPU; an Odec Computer Systems, Inc. 125 line/min printer; and three Applied Digital Data Systems, Inc. 580 CRT terminals.

The system also uses 10K-char./disk Control Data Corp. disk systems and a Wangco, Inc. dual disk drive unit.

Buvinghausen attributed his choice of equipment to a "basic trust" in the then-new firm, but he could not be more specific. "It was doing a lot of custom programming, which may or may not have been necessary, but it looked good and it sounded good," he explained.

"We did not want to get involved in a complex operation that would change our way of doing business or entail the hiring of specialized computer personnel. We wanted a system that we could understand and manage ourselves," he said.

The system was installed in August 1976. The following November the first head crash occurred on the fixed disk unit, and the system went down for four days. Citation "tried to explain it off as dirt," Buvinghausen said.

After a second head crash and a three-

(Continued on Page 56)

Modcomp Line Gains Two Superminis

By Jeffry Beeler
CW Staff

FT. LAUDERDALE, Fla. — The main storage capacities of the Modular Computer Systems, Inc. Classic family reportedly increased fourfold recently when the firm expanded its "supermini" line with two additional members, both sporting enhanced memory modules.

The larger of the two introductions — the Model 7870 — boosts the Classic family's memory size to as much as 2M bytes compared with a maximum of 512K bytes for the Model 7860, until recently the sole member of the Modcomp supermini line.

The second Classic addition stores up to 1.25M bytes and represents an expanded memory version of the 7860, according to a Modcomp official.

At present, the Classic family consists only of the 7870 and the two 7860 versions. This fall, however, Modcomp plans to introduce two additional models tc bring the total number of Classic series members to five, the spokesman added.

Unlike the original 7860, which uses 4K random-access memories (RAM), the two latest Classic models incorporate 16K RAMs, and the spokesman gave the denser memory technology most of the credit for the pair's increased storage capacity.

Modcomp's Classic 7870 features memory capacity of up to 2M bytes, four times that of the original Model 7860.

Both the 7870 and the revised 7860 use the 16K RAMs as part of their enhanced solid-state storage modules, each of which stores 512K bytes on two plug-in memory boards. One module provides two-way interleaving, but by adding a second module, users of the two latest Classic processors can reportedly achieve four-way interleaving.

Users can also add the enhanced memory modules to the original 7860 to make that CPU comparable in storage capacity to the latest 7860 version, the official said.

Primary Applications

Intended primarily for scientific and industrial measurement/-control applications, the 7870 and the revised 7860 version reportedly belong in the same product class as the Digital Equipment Corp. PDP-11/70 and VAX-11/780, Data General Corp. M/600 and Prime Computer, Inc. Model 500.

Recent Modcomp benchmark tests, however, show the two Classic CPUs provide "quite a bit more than twice" the throughput of the PDP-11/70 and M/600, with a much smaller performance edge over the VAX-11/780, the spokesman reported.

Unlike some of their competitors, the Modcomp machines are also "ruggedized" to withstand severe industrial environments and offer features like the ability to operate at up to 55°C, he added.

Hardware- and software-compatible with each other and the original 7860, the 7870 and the enhanced 7860 provide roughly the same level of processing power and differ from one another only in their main storage memory capacity, the official explained.

The Model 7870 stored a minimum of 512K bytes, compared with 128K bytes for the latest 7860, and both machines cycle in as little as 125 nsec. A solid-state error-correction feature in the Classic family's storage modules typically boosts that cycle time by 100 nsec for each memory fetch.

But the modules' four-way interleaving effectively reduces accessing delays fourfold to 25 nsec, the spokesman explained. Thus, even with the error correction code activated, the Classic series still cycles as fast as 150 nsec.

Moreover, the error-correction feature is software-selectable; when it is unneeded, it can be "shut down" to negate its cycle-extending effect, the official said.

Both Classic family members

(Continued on Page 56)

Mini Bits

DG Users Prepare To Meet in Boston

BOSTON — At least 500 Data General Corp. users from around the world are expected to attend DG's fifth annual Users Group Meeting Aug. 30-Sept. 1 at the Sheraton Boston Hotel here.

The three-day event will feature an assortment of application presentations, workshops, seminars and panel discussions.

The applications presentations will cover fields like education, health, manufacturing, finance, government and science, DG spokesmen said.

Seymour Schweber, president of Westbury, N.Y.-based Schweber Electronics, Inc. will deliver the keynote address entitled "Computer Myopia."

The meeting will also provide displays of several DG computers and support systems, including the CS/20 and CS/40, the firm's latest small business systems.

Additional information about the meeting is available from Pat Schultz, Annual Meeting Coordinator, DG, Westboro, Mass. 01581.

Corrections

An article about the Pertec Computer Corp. XL20 [CW, July 10], might have left the impression that the distributed processing system is disk-based. In fact, it is diskette-based.

In another story [CW, July 24], a headline referring to the Digital Computer Controls Inc. (DCC) Synergist series read, "DCC Line Runs IBM Programs." Contrary to the headline, the DCC small business systems are not software compatible with their IBM counterparts; they do offer compatibility within their own line, however.

Portable Micro Runs BAL, Fortran

MINNEAPOLIS — Though small enough to fit in a suitcase, a portable microcomputer from R2E of America reportedly offers enough processing power to accommodate BAL and Fortran.

All Micral V's hardware modules — CPU, printer, display terminal and minifloppy disk system — fit inside a 22-in. by 14-in. by 7-in., carrying case, according to spokesmen for R2E, the North American subsidiary of Realisations Etudes Electroniques, a French microcomputer manufacturer.

Capable of operating either as a stand-alone system or as a remote terminal, the microcomputer system uses 12- or 24 Vdc or 120 Vac, company officials said.

Micral V incorporates an Intel Corp. 8080-based CPU with 32K bytes of random-access memory expandable to 64K bytes, 1K byte of erasable, programmable read-only memory, a 480-char. display panel, 13-key numeric keypad, 80K-byte single-density minifloppy disk system with a double-density option, 32 char./line printer, Centronics Data Computer Corp. printer interface and power supply.

Standard system software includes BAL with monitor, editor and utilities plus sequential, indexed sequential and random-access file systems, R2E officials said.

Hardware options include a second minifloppy disk system and a serial communications channel. Optional software includes an Ansi Fortran IV compiler.

Micral V costs $7,995 with OEM discounts available from R2E at 3406 University Ave. S.E., Minneapolis, Minn. 55414.

DG Minis Get Printer

ALBUQUERQUE, N.M. — A printer for Data General Corp.'s Nova and Eclipse lines outputs 300 monocase line/min or 220 line/min with 64 Ascii characters, according to the product's maker, Business Information Systems, Inc.

The Model 1087 needs one interface board to plug into any Nova's or Eclipses's backplane, a company spokesman said. It also prints 80 or 132-column lines and provides single- or double-line feed capability with program-controlled horizontal and vertical tabulation.

In addition, the printer accepts fan-folded forms 4-1/8- to 15 in. wide and 2.5- to 22 in. long.

The Model 1087 costs $5,000 and is available from Business Information Systems at Box 6254, Albuquerque, N.M. 87107.

Siemens Offers Floppy System In Two Versions

ANAHEIM, Calif. — Compatible with their Shugart Associates counterparts, a series of floppy disk systems from Siemens Corp. reportedly stores 3.2M bits in single-density format and 6.4M bits in double-density format.

Both members of the FD 100-8 line provide compatibility with IBM floppy disk systems and accept IBM 3740-formatted diskettes storing up to 1.9M bits, according to Siemens officials.

Using the MFM encoding technique, the storage systems package all data transfer, positioning and control circuitry on one printed circuit card. Each operates in a daisy chain and provides features like Track 00 sensing and automatic erase timing.

Options available with the FD 100-8 line include door interlock, which prevents operator errors during data transfer; hard-sector detection, which separates index pulses from sector pulses; and write protect.

The disk drive family also provides automatic diskette ejection and other features that prevent a cover from closing on a partly inserted diskette, the spokesmen added.

Mountable in a 19-in. rack, the systems cost $580 from Siemens at 1440 Allec St., Anaheim, Calif. 92805.

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LSI-11 Gains Interfaces

HARTFORD, Wis. — A serial asynchronous interface and a parallel line printer interface, both for the Digital Equipment Corp. LSI-11 microcomputer family, are among the products introduced recently by General Robotics Corp.'s (GRC) newly formed Components Division.

Hardware- and software-compatible with the DEC DLV11, the asynchronous interface offers switch-selectable addressing, transmission rates, stop bits, parity options and vectors. Users can also set the transmisssion rate, stop bits and parity options under software control.

The asynchronous and printer interfaces cost $250 and $300, respectively, from GRC at 57 N. Main St., Hartford, Wis. 53027.

Board Holds Dual-Port RAM

SANTA CLARA, Calif. — A 16K-byte dual-port memory, sockets for a universal peripheral interface (UPI) and system bus control logic for up to 16 devices are among the features of a single-board microcomputer from Intel Corp.

Other features available with the ISBC 80/30, a third-generation member of the company's ISBC-80 family of compatible products, include 12-level vectored priority interrupt, a programmable communications interface, 24 programmable I/O lines with sockets for interchangeable line drivers and line terminators and system/development software support.

With the 80/30, all dual-port random-access memory (RAM) resides on one board, whereas previous ISBC products required multiboard configurations to provide equivalent amount of storage, according to Intel officials.

The unit provides a triple-bus architecture that incorporates on-board, dual-port and system buses. The on-board bus accommodates an Intel 8085A microprocessor and read-only memory (ROM) while the system bus permits expansion through the addition of modules like direct memory access devices and other single-board computers, the spokesmen said.

The dual-port bus incorporates a dual-port controller, 16K-byte RAM and RAM controller.

With the 80/30, users can also attach an Intel 8041/8741 UPI chip that serves as a slave processor by controlling system peripherals and thus freeing the 8085A to perform other functions.

Working with Intel's 8251A universal synchronous/asynchronous receiver/transmitter, the 80/30 reportedly permits extended RS-232C communications and links to RS-232C-compatible peripherals like CRT terminals and cassette memory systems.

The 80/30 costs $1,160 and is available from Intel at 3065 Bowers Ave., Santa Clara, Calif. 95051.

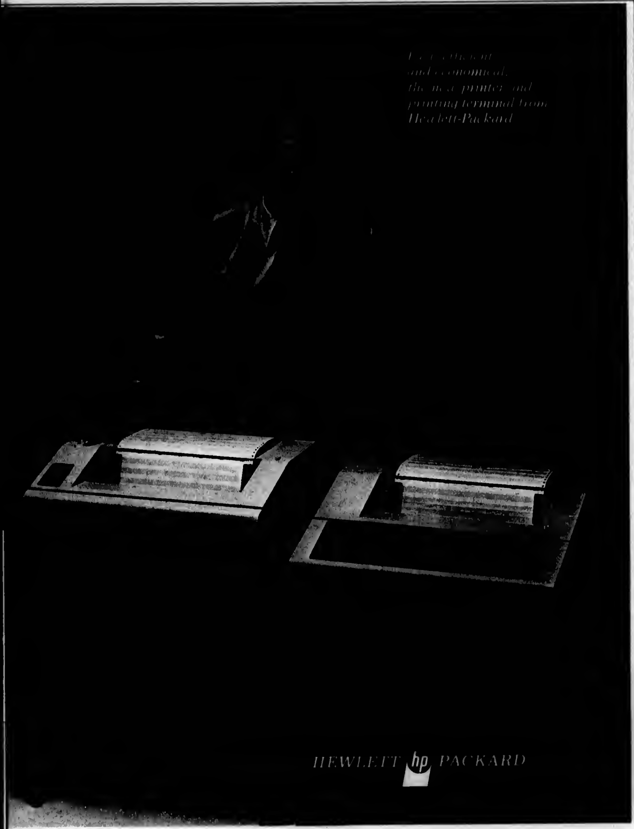
Report Compares 294 Mini Printers

DELRAN, N.J. — Features of 294 minicomputer printer models from 75 vendors are said to be detailed and compared in an updated Datapro Research Corp. report entitled "All About Minicomputer Printers."

Reprinted from *Datapro Reports on Minicomputers*, the 67-page report also discusses the rapid growth of minicomputer printer use, explains the advantages and disadvantages of various types of printer use and delineates the functions of minicomputer printers, according to a Datapro spokesman.

Comparison charts list the minicomputers each printer interfaces, its primary markets, its operating specifications (including speed, printing techniques, character set and char./line), software support, packaging, maintenance supplier, pricing and availability.

A copy of the report costs $12 from Datapro at 1805 Underwood Blvd., Delran, N.J. 08075.



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Supplier Encounters Woes Of Disk Head Crashes

(Continued from Page 53)

day shutdown a month later, Citation suggested Central Supply leave the system running all night instead of shutting it down, as the firm had been doing. "It said that would keep the surfaces clean and I wouldn't have any more trouble with magnetic dust," Buvinghausen said, "so I said OK.

"About eight months later there was another head crash, and I'd been leaving the system running all night for all that time," he recalled. "That one was kind of unexplained — Citation didn't know what caused it." Whatever the reason for the crash, the system went down for another four days.

Holding His Breath

Now Buvinghausen is just "holding his breath" to see what happens in the future. "If it happens again, I'm going to go 'straight up,' " he said, because the crashes meant losses in manpower, hours and business time.

Buvinghausen said he believes the fault lies with the Wangco disk drives and not the Century CPU. He also said Citation has stopped using the Wangco disk drives in its systems and instead offers CDC disk drives.

"I have no complaints about the CPU; I've had a chip go bad or something like that, but that's about it," he noted.

A spokesman for Citation confirmed Buvinghausen's statement that Citation's systems no longer incorporate Wangco disk drives. Moreover, Citation has switched from Century processors to Warrex Computer Corp. processors, which were "set up for CDC drives," the spokesman said.

He added that the CDC drives "seem to be generally a bit sturdier than Wangco's and there seem to be fewer head crashes in the field with the CDC equipment." Although he could not cite an exact figure, the spokesman said his firm had experienced several head crashes with the Wangco drives.

Wangco representatives claimed to know nothing about Central Supply's problem, but a spokesman said, "Whatever the problem was, we don't manufacture that disk drive anymore."

Wangco "supplanted and replaced" the Model 1 series with its Super Series family last year, according to a spokesman who conceded the Model 1 "wasn't as good a drive."

The Wangco spokesman claimed, however, that "there was nothing in the way of head crashes that was a particular problem" with the Model 1 drives.

Important System

Although the Central Supply system has been running "pretty smoothly" since the last crash, Buvinghausen plans to evaluate it for another six months.

The system is important to Central Supply for a number of reasons. From its two master files — a product file and a customer file — the company can generate up-to-the-minute billing at the close of each month, print invoices and continuously update inventory profile.

In addition, when an order arrives or a customer is at the counter, the clerk can consult a CRT terminal to determine immediately if the product is in stock. No physical search is necessary, nor is calculation of recent sales, Buvinghausen said.

Every two weeks Central Supply generates a price list report by manufacturer and a summary report that gives current and year-to-date gross sales and cost totals. "All of this not only makes ordering a lot easier, but it also tightens control over inventory," Buvinghausen said.

Modcomp Adds Superminis

(Continued from Page 53)

incorporate a "multiword architecture," the spokesman added, and thus "do not qualify as true 16-bit or 32-bit machines." Although they fetch memory in 16-bit units, the processors are said to use 32-bit and 64-bit architectures in their internal buses.

Like the original 7860 introduced last February, the two latest additions to the Classic series support up to 63 peripherals including a "virtually unlimited" number of 100M- and 200M-byte disk units plus Modcomp's line of CRT terminals and matrix printers.

The processors also accommodate the company's family of process I/O equipment like magnetic tape drive systems.

Memory Features

The two product line introductions also use the same memory protect, virtual memory addressing, extended memory addressing and memory mapping schemes as the original 7860. In addition, all three processors provide five simultaneous memory access paths that give users concurrent access to CPU and I/O operations.

Among their communications features, the Classic family members offer an optional communications processor that extends the computers' set of 367 basic instructions and supports up to 256 full-duplex Synchronous Data Link Control, Higher Level Data Link Control, asynchronous RS-232 and current-loop lines transmitting up to 250k bit/sec.

Software Support

Software support for the processors includes Modcomp's Max IV operating system, which accommodates two extended versions of Fortran; Cobol; Cincom Systems, Inc.'s Total data base management system; and a process control language named "Maxime" for Modular Application Executive for Industrial Engineering.

A 128K-byte 7860 CPU with I/O processor sells for $42,000, while a 7860-based configuration with a 10M-byte disk drive unit, CRT terminal and line printer costs $74,500.

A 512K-byte 7870 with a dual I/O processor costs $64,000, compared with $96,450 for a similar configuration with a 10M-byte disk unit, CRT terminal and line printer.

Deliveries of both the 7870 and the enhanced 7860 will begin during the fourth quarter from Modcomp at 1650 W. McNab Road, Ft. Lauderdale, Fla. 33309.

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Takes on Mainframe Job

Micro Brings Savings in Nasa Project

By Nancy French
CW Staff

GREENBELT, Md. — A $5,000 microcomputer system has been programmed here for the National Aeronautics and Space Administration (Nasa) to process an application now being handled by a larger general-purpose computer in the "$85,000-plus class" and do it in real time. This is a step up from the batch service now provided by the mainframe.

The micro, custom-built for Nasa's Goddard Space Flight Center by Old Dominion Systems in Gaithersburg, Md., was developed to process data that enables about 50 using agencies to keep track of the weather as well as the locations of the meteorological balloons and buoys that measure it — worldwide, according to Paul E. Schmid. Schmid heads Goddard's measurementss evaluation branch here and served as technical officer for the demonstration project.

The work that may someday be assumed by such user-owned and -operated micros is presently being batch processed with a 65K Data Control Corp. 3300.

The CDC 3300 processes data transmitted by the weather beacons to an orbiting satellite — at present the Nimbus 6 — which records the measurements along with their geographical locations on tape and then sends that data via microwave signals to parabolic dishes on the ground. At one time, Nimbus can read signals from weather beacons for a diameter of 6,000 kilometers.

At present, two tracking stations — one in Fairbanks, Alaska, and the other in Rosman, N.C.. — capture the data on magnetic tape and relay it via telephone lines to Greenbelt, where it is recorded and then processed on the 3300. The 3300 is dedicated to this function. In case of problems, an IBM 360/95 and a Digital Equipment Corp. PDP-11/70 minicomputer are available for backup, Schmid said.

User agencies then get either the position information on designated beacons or that data along with the actual temperature, pressure and humidity readings predesignated sites via teletypewriter or mail. Turnaround time is from one hour to several days.

Output Ready Sooner

In contrast, the microcomputer demonstration project was carried out in real time, and output data was ready for users in half an hour, Schmid said.

Here, signals collected and recorded by the satellite were dumped at predetermined times to a ground satation at Greenbelt. Then, rather than storing the signals on tape, the micro placed them in 8K random-access-memory (RAM).

The micro then processed the data in its MCS 6502 single-chip processor manufactured by Rockwell International.

The micro's 16K-byte read-only-memory (ROM) contains all the programs, reduced to firmware, necessary to process and prepare the data for output to each user agency for as many as 50 beacons, Schmid said.

The ROM in the demonstration model consists of 16 2708 chips — each containing 1K byte of memory from various sources. RAM is 8K bytes of 2102 chips also fram various sources.

A standard RS-232C interface chip lets the unit drive a standard Teletype Corp. ASR-33 for output, and a Motorola, Inc. 6820 interfaces the unit with a standard Ascii keyboard.

The microcomputer also operates a "very low-cost TV scantype display unit from a Japanese company," Schmid said.

The whole project cost Nasa $30,000, according to Schmid, and now that the system is developed, duplicate units can be built for $5,000. Such a low-cost unit could enable users to install their own simple antennae and then receive and process their own data, completely bypassing Nasa's mainframe.

(Continued on Page 58)

Datapro Outlines Micro Specs

• *Report Focuses On 146 Systems*

DELRAN, N.J. — Datapro Research Corp. has published an updated report called *All About Microcomputers* which provides users with extensive specification information on 146 microcomputers being offered by 57 vendors.

The specification charts compare competing systems, including information on packaging, the type of microprocessor used, memory types, input/output controls, software, principal applications performed and pricing and availability.

The report also includes guidelines and information on trends among micro vendors and users. It outlines and explains the three main divisions in the field — OEM microcomputers, development systems and hobbyist home computers.

Datapro notes the importance and benefits of each micro to potential users and lists guidelines on what to look for and how to select the most appropriate system. Vendor addresses are listed.

Datapro found that random-access memory (RAM), read-only memory (ROM) and programmable ROM as well as clocks and memory interfaces are all being included on microprocessor chips. As a result, there are

(Continued on Page 58)

• *Update Examines Advances in Chips*

DELRAN, N.J. — A Datapro Research Corp. report on microprocessor specifications notes that microprocessors "continue to be the hottest products in the electronics and DP industries."

The updated report, reprinted from a supplement to *Datapro Reports on Minicomputers*, provides detailed specifications on 109 models of microprocessors from 25 vendors. Guidelines and insights into the future of these "computers on a chip" are included in the 28-page report.

Datapro defines a microprocessor as the central unit of a microcomputer.

The report cites advancements such as improved etching and masking techniques which provide for more complex smaller circuitry, which permits faster operation.

Random-access memory (RAM), read-only memory (ROM) and programmable ROM (Prom), clocks and memory and I/O interfaces are being included on the microprocessor chip — all of which makes it more difficult to distinguish between the microcomputer and the microprocessor, according to Datapro.

The report also notes that industry experts predict that future microprocessors will be

(Continued on Page 58)

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Extender Card Cuts Crosstalk

TALLAHASSEE, Fla. — An S-100 extender card designed to eliminate signal crosstalk and noise pickup is being offered by Objective Design, Inc.

The Double-X Extender reportedly uses a special pattern which runs ground lines between signal lines on both sides of the board. The pattern was also designed to prevent coupling of signals through the board, according to the firm.

The board costs $34.95 in kit form and $44.95 assembled with a $3 shipping charge from Objective Design, Inc., P.O. Box 20325, Tallahassee, Fla. 32304.

Guide Offered for Polymorphic 88

SANTA BARBARA, Calif. — A "de-jargonized" instruction manual for the non-DP user has been developed by Polymorphic Systems for its System 88 microcomputer.

Used with the company's Basic language disk, the manual guides nontechnical people in operating the System 88 for complex problem solving and word processing, the firm claimed.

The Basic system disk includes enhanced operating software, Basic, text editor and assembler. Added to the Basic language are string arrays and array commands, which allow the user to create and manipulate mailing lists, personal records, inventory and billing, according to the firm.

The improved text editor permits the user to move, duplicate or delete blocks of text, and macro instructions have been added to the assembler.

Polymorphic Systems is at 460 Ward Drive, Santa Barbara, Calif. 93111.

Nasa Micro Brings Savings

(Continued from Page 57)

One of the chief benefits of the microcomputer is its low cost. The capacity of the micro's processor "is in a sense the same as that of the 3300 since the CPU can address 65K bytes of memory," Schmiud said.

Expanding the memory is simply a matter of adding boards that cost about $50. The micro could be made large enough to do the entire monitoring and processing job or left small enough to make the units affordable for individual using agencies, he explained.

"The most expensive parts of the system are the peripherals," he said.

Although the project was considered to have been a success, just what the outcome will be is not yet known since Nimbus itself soon will be replaced by a new satellite known as Tiros N.

New services will be offered with Tiros and some overseas users may wish to use them rather than install their own systems or continue to use services provided by Nasa, Schmid indicated.

Users receiving meteorological or beacon position data from the existing system include such diverse organizations as the U.S. Oceanographic and Atmospheric Administration; the University of Washington; the Centre National Exploitation Des Oceans, in France, and the Alaska Department of Fish and Game.

A complete technical exposition of this project has been written and published as Nasa Technical Memorandum 78046 by Schmid and J.J. Lynn, vice-president and chief research engineer at Old Dominion Systems.

DOING
BIG THINGS
WITH SMALL SYSTEMS

A Special Report on Minicomputers and Small Business Systems in the August 28th Computerworld.

As small computer systems have become less and less expensive, the question has changed from "whether to buy" to "how to apply". A furniture store in L.A. found a mini worthwhile in cutting its delinquent accounts, while a survey company in England is using a mini on board to help locate North Sea oil reserves. And as the price tag on small business systems continues to drop, their applications will increase geometrically.

In our August 28th Special Report, we'll be taking a closer look at the profits (and pitfalls) of mini-using. Featuring a series of applications and tutorial stories, this supplement will examine how others have solved their mini problems, and will include tips from vendors. It will cover topics like:

- *Use of small computers in large system hierarchies*
- *Minicomputers as software development tools*
- *How to select a printer for mini systems*
- *Future developments in disk systems design*
- *Maintenance of magnetic storage media*

If you're interested in new ways to increase efficiency and cut costs in your business operations, don't miss this *Computerworld* Special Report. And if you are a manufacturer or dealer in minicomputer equipment, your ad should be there. Closing date is August 11th. Call your *Computerworld* salesman for more information and complete assistance in ad planning. Or, to place an ad, call Terry Williams at (617) 965-5800.

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Datapro Focuses On 146 Systems

(Continued from Page 57)

fewer input circuit packages than ever before, and more board space available for other functional units.

Among the microcomputers analyzed in the report are the Apple Computer, Inc. Apple II, the Automated Computer Systems line of micros, the Commodore Pet 2001 and Kim-1, the Data General Corp. Micronova, the Fairchild Formulator Mark II, the Imsai line, the National Semiconductor, Inc. line, the Pertec Computer Corp. Mits Altair 8800B and the Signetics line.

The report is available for $12 from Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Update Reports Chip Advances

(Continued from Page 57)

more I/O-oriented than today's models and there will be more emphasis on microprocessor-controlled peripherals such as floppy disk controllers, CRT controllers and printer controllers.

The report's detailed comparison charts list specifications in microprocessor packaging including chip technology, the number of chips in a CPU and the number of pins per chip, for example. The architecture and performance specifications include data word size, bits, clock frequency and the number of phases per cycle.

The report also includes pricing and availability data on each microprocessor.

Microprocessor Specifications costs $12 from Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

Erwin Tomash Has a Mission

Babbage Institute to Trace DP History

By Marcia Blumenthal
CW Staff

NEW YORK — It is rare that any industry can be traced from infancy to sophisticated adulthood in only 30 years. But Erwin Tomash, founder and chairman of Dataproducts Corp., has seen it happen, and he thinks the time is ripe to begin putting the DP industry into perspective.

Tomash, a vital and intellectually curious man, founded the Charles Babbage Institute (CBI), a nonprofit foundation dedicated to the history of the information sciences. CBI takes its name from Charles Babbage (1792-1871), an Englishman who was the father of modern day calculating machinery.

Still in its formative stages, the institute might have gone unrealized; fortunately, however, Tomash decided five years ago to write a book on his participation in the growth of the computer industry.

Before attempting the book, Tomash took some history courses to help him develop historical perspective. During his studies he met several historians and he himself was interviewed for the Smithsonian Institute's oral history program.

After a few years of study, Tomash sportingly admitted his own reminiscences may have been too limited to give the proper historic perspective to the industry. So, a year ago, he decided that rather than write a book, he would "bring the computer community together" — the technologists as well as the entrepreneurs — to develop a broad view of the industry, with historians tying together the experiences.

In founding CBI, Tomash had several objectives. First, the elements considered history should be as broadly based as possible, encompassing many different perspectives. Describing the breadth of the project, Tomash said the industry should be viewed on an international basis and include input not only from institutions, professional societies, historians and universities, but also should record the activities of the first salesmen and engineers and document the influences of government.

Tomash also believes the history must be of high quality and professionally written, taking into consideration the social, economic and political ramifications of the DP industry's growth.

Moreover, it should be some fun, a pleasurable experience: "The world is heavy enough, so I didn't want to do it if it wasn't fun."

Although excited about the formation of CBI, Tomash's experience, gained from his long career as an executive, dictates caution. Over breakfast at the Waldorf-Astoria Hotel here recently, he ticked off the highlights of his career.

Erwin Tomash

A graduate of the University of Minnesota with a degree in electrical engineering, Tomash joined the U.S. Army Signal Corps. Upon his return from the service, he spent a year teaching at the University of Minnesota, quickly learning that he didn't like being a professor.

After a short stint with the Naval Ordinance Laboratory in Washington, D.C., Tomash realized the life of a bureaucrat was also not for him. In the fall of 1946, he joined the Engineering Research Associates, one of the first firms doing computer work.

Engineering Research later merged with Remington Rand, which later merged with Sperry. In 1953, Tomash moved to the West Coast, setting up Sperry's first sales office — one of the first in the nation. Three years later, in 1956, he left Sperry Univac to join Telemeter Magnetics, the first independent core memory manufacturer. In 1962, shortly after the company was sold to Ampex, Tomash founded Dataproducts Corp., today one of the largest manufacturers of printers.

So, with the caution of a seasoned executive, Tomash waited until late last year to have his lawyers set up a nonprofit organization with the general purpose of fostering the work of historians. He contributed $150,000 of his own money to get the fledgling institute started.

Still not sure the idea would fly, Tomash

(Continued on Page 62)

Company Aiming to Package DDP as Mass-Produced Item

By Marcia Blumenthal
CW Staff

NEW YORK — Distributed data processing (DDP) is an idea whose time has just barely arrived, but DDP Products, Inc. is already aiming to sell the concept as a mass-produced package.

The major product of the company, formed last January, is an IBM 3270 emulator made for IBM's own Series/1 minicomputer [CW, Feb. 2]. The emulator was built by DDP Products' parent company, Conversational Systems Corp., and DDP Products was set up as a marketing entity.

The 3270 and its non-IBM but compatible counterparts is the remote terminal most widely used as the communications link to the IBM 370 mainframe. Because most 370s use 3270 protocols, the choice of peripherals for users desiring to adopt DDP was limited, according to Jeffrey Goldfarb, DDP Products' vice-president of technical marketing.

With the 3270 emulator, a Series/1 connected to a 370 provides 3270 emulation for IBM and non-IBM terminals.

Occupying a narrow building on East 28th St., DDP Products shares several floors with Conversational Systems. Here several systems are in the developmental stage, and the company also has about four fully operational demonstration systems for potential customers.

The most difficult task during the first six months of the company's life was focusing on the idea of the company and solidifying its goals. "Now that we know where we are going," Goldfarb said, "we are bringing the products that currently exist to the marketplace on a more than exploratory basis, and

(Continued on Page 60)

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Firm Packaging DDP as Mass-Produced Item

(Continued from Page 59)

we are beginning to identify the next products the company needs to round out its line."

To get those products to the marketplace, DDP Products brought in Jon Gould as vice-president of marketing. Gould was hired away from Citibank, a pioneer in DDP, where he was vice-president of the Technology Management Group.

"Essentially, we are putting together a lot of things that exist now to come up with a completely free-standing or remote data processing system — including 3270 emulation, data entry, Cobol and data management," Gold said. "So we are working on system 'underware' rather than specific applications."

DDP Products is an OEM purchaser reselling varied equipment in a bundled package to its customers.

Less Customizing Predicted

Ideally DDP Products would like to become a DDP catalog shop, with off-the-shelf items meeting the needs of a broad range of customers. The day of customized systems is coming to an end, Gould prophesied.

Although the company would like to do less customizing, it recognizes that this capability adds to its bread and butter.

Gould noted DDP Products has been successful at taking a product and adding something to it. "The interface with Conversational Systems gives us the expertise for custom engineering," he said.

Right now, users don't want what's there, they always want a little bit more: "The problem is to get the users to understand and that if they accept standardized items, there will be less of a problem," according to Goldfarb, who pointed out this strategy has been a mainstay of the automobile industry.

Although DDP Products takes a mass-produced approach to DDP, it wants to apply this approach to serving both the user who wants a specific product as well as the user who wants to make the move to DDP, but isn't exactly sure what he needs.

Aside from the problem of convincing the user to accept standardized systems, DDP Products recognizes the need to beef up its product line. "Right now we have the chassis of the car, but we still need all the other parts in order to cover a broad base of users," Goldfarb said in explaining the company's dilemma. "We have to refine the requests coming in from customers and develop products to meet those needs."

Narrow Customer Base

The company is presently focusing on a fairly narrow customer base — sophisticated users with IBM equipment who are entering the DDP and communications environment and need flexibility. These users are not afraid to spend money and are convinced that IBM products offer more than just hardware, Goldfarb said, noting the most interest in the company's products has come from IBM customers.

Second-generation customers, perhaps a year down the road, will be users interested in DDP who may not want to link that capability to an existing system. This type of user, Goldfarb said, could be a first-time user or a current user developing a system for a new area of business.

For example, the user may be doing payroll on one system, but may not want to do sales order entry on the same system, he said.

"We are touting the hell out of the IBM sales force so that when customers say they want hardware and software, IBM will refer them to us," Gould emphasized, adding that IBM is obligated to give two or three references of companies who do work on the Series/1.

In addition to liaison with the IBM sales force, DDP Products is marketing its products through trade shows and a lot of direct mail, bringing in groups of potental users for live demonstrations on the systems set up at the company's offices.

With six-month sales of $1.5 million under DDP Products' belt, Gould projected sales of $3 million to $5 million for the next 12 months. One problem is arranging nationwide sales coverage and formalizing the sales structure. "Right now, everybody is selling," Goldfarb joked.

Options being considered are distributorships and sales representatives or a combination of the two. Gould hasn't made any final decision on the future sales strategy, but "it's in the mill."

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Executive Corner

- Ronald A. Bamberg has been appointed manager of corporate marketing at Tymnet, Inc.
- Sterling L. Williams has been named vice-president of domestic operations at Inforex, Inc.
- Billy Graham has been elected president of Optical Business Machines, Inc. Charles West, former president, has been elected chairman of the board.
- Joseph E. Eichberger has been named vice-president of advanced systems at Lexitron Corp.
- Dr. Robert C. McFarlane has joined Scientific Software Corp. as corporate vice-president of operations.
- Robert VanHellemont and Darryl Hastings have been appointed vice-presidents at CMI Corp.

IBM Tops $1 Billion

DP Firms Among Top '77 Spenders for R&D

NEW YORK — Fifty firms accounted for 60% of the total U.S. corporate investment in research and development in 1977 — and nearly one-third of those firms are computer industry participants.

Of the total $20 billion spent by U.S. industry on R&D, the top 50 firms spent $11.9 billion; 1,000 other companies contributed the rest of the expenditures, according to an annual survey by "Inside R&D", a weekly newsletter.

Although IBM spent more than $1 billion on R&D in 1977, it was nudged out of second place by Ford Motor Co., the report noted.

The highest rate of R&D growth came from Digital Equipment Corp., with a 36.4% increase in R&D spending from 1976. DEC, the smallest company on the list and No. 231 of the Fortune 500, spent $79 million or 7.5% of its revenues on R&D.

Over the past year, Texas Instruments, Inc. boosted its R&D spending by 33.1% to $96.2 million.

The ratio of R&D to sales showed an interesting pattern, "Inside R&D" reported, with the high-technology firms in the forefront. For the second year in a row, the highest R&D:sales ratio went to Hewlett-Packard Co., clocking in at 9.2%.

The median percentage of sales spent on R&D by the top 50 in 1977 was 3.7% compared with 3.5% last year, the report said, adding, however, that inflation played part in the upward spending trend. Nearly all of the computer-related firms among the top 50 spenders exceeded the median percentage in their R&D expenditures.

Going along with the trend in increased R&D spending, Sperry Rand Corp. recently announced at its annual meeting that it will spend $1 billion in R&D for Univac operatons alone over the next five years.

This came as a result of Univac's contributing 47% of the corporation's total revenues in fiscal 1978, up from 44% a year ago. Univac's revenues totaled $1.7 billion this year, an increase of 18% from 1977.

Northern Telecom Sells Large SL-1 For Saudi Harbor

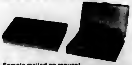
MONTREAL — One of the largest private digital telecommunications systems in the world has been shipped to Jeddah, Saudi Arabia, a major Red Sea port for outbound Arab oil.

A 3,000-line SL-1 digital electronic private automatic branch exchange will replace three existing telecommunications systems and serve all administrative and shipping facilities in Jeddah harbor, according to the vendor, Northern Telecom Canada Ltd. of Montreal.

The system is the largest SL-1 so far produced by Northern Telecom; expansion to 5,000 lines is planned. Installation will be completed later this year, the vendor said.

The SL-1 is controlled by computer software and includes custom-designed electronic telephone sets and user features that include push-button "ring again" for busy numbers, on-hook dialing, a call-waiting indicator and single-button dialing for frequently called numbers.

Northern Telecom has provided three other SL-1 systems to Saudi Arabia in recent months. One serves King Abdoul Aziz University in Jeddah, another is installed at the Jeddah airport and the third is a multicustomer installation at the Dhahran Medical Center in eastern Saudi Arabia.



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Dataproducts Head Founds Babbage Institute

(Continued from Page 59)

formed an advisory committee consisting of members from industry, the professional community and historians. Paul Armer, a pioneer in the industry, agreed to serve as CBI's executive secretary.

One of the first tasks of the committee was to search for role models. It discovered that the American Institute of Physics has a center for the history of physics located in New York City that acts as a clearinghouse for the work being done in this area; it also found the University of California at Berkeley's Bancroft Library is dedicated to the study of the history of electronics in the West.

The committee decided CBI's most important task would be to build a rich data base, collecting as much material as it could from as many sources as possible, and to encourage the use of that data base.

'We'd Have History'

"If we did this, we'd have history," Tomash pointed out. "Without a data base, you can't interest students researching the subject because they want to build on previous information rather than starting from scratch."

The committee also decided the archives would be better developed through historians rather than computer people. Putting into perspective just what was in the social environment that allowed the technical person to develop into an entrepreneur is a really crucial question in examining the phenomonon of the DP industry, Tomash explained.

Although the institute is barely off the ground, Armer is already working full time. A full-time historian and a full-time archivist will probably also be hired.

The data base will be built through the research of historians and others interested in the industry. The research will be commissioned by CBI, which has announced a graduate student fellowship to the history departments of more than 200 graduate schools.

A permanent site has not yet been chosen for the institute, which currently is located in Palo Alto, Calif. Also still to be decided is whether CBI will affiliate with a university or another foundation. It is now chartered as a foundation.

"It's an idea whose time has finally come," Tomash said.

Recently the American Federation of Information Processing Societies announced a journal called *The Annals* to be published a year from now. Tomash does not view the budding interest in the history of the computer industry as a competitive threat. CBI's intent is to promote cooperation rather than competition, Tomash stressed.

Continued funding is expected to come from private sources, both from industry and from individuals, Tomash said.

Tomash is still considering writing his book — someday — but now the Charles Babbage Institute is keeping him busy.

Supershorts

Datapoint Corp. has named the International Sales Group, Inc. of Boston, London and Frankfurt to handle the distribution of Datapoint's OEM tape and disk drive products in Western Europe. Datapoint's wholly owned subsidiary, Amcomp, Inc., has become the Peripheral Products Division of Datapoint.

— — —

Pertec Computer Corp. (PCC) has signed an exclusive wholesale agency agreement with Compelec Electronics, Ltd., London, for the distribution of small business systems in the UK and Ireland.In other news, PCC signed a two-year agreement with Datum, Inc. to provide field maintenance for its line of minicomputer peripheral equipment.

— — —

Richard Baker, president of Dataware, Inc., and Chris Ragland of Computer Brokerage have been elected to the executive committee of the Computer Dealers Association. Eighteen additional computer dealers and leasing companies have been accepted into the association, marking a 28% increase in its membership.

— — —

Lundy Electronics & Systems, Inc. has entered into an agreement with NCR Corp. whereby NCR will manufacture Lundy-developed document reader/sorters used by banks. Lundy received $3.5 million, which includes the cost of license fees and technical assistance to NCR during production startup.

— — —

Genesis One Computer Corp., a Management Assistance, Inc. company, will change its name to Wordstream Corp. on Sept. 1.

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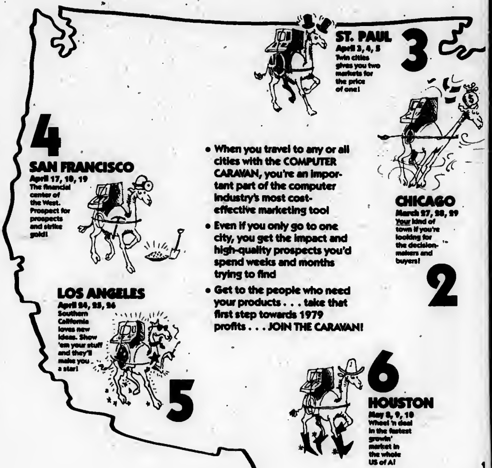

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Expects Strong Printer Business

Dataproducts Posts 40% Earnings Rise for Year

By Marcia Blumenthal
CW Staff

NEW YORK — Dataproducts Corp.'s annual earnings increased 40% while revenues gained 20%, Graham Tyson, Dataproducts president, told shareholders at the firm's first East Coast annual meeting, held here July 27.

At an informal press luncheon preceding the meeting, Tyson and other Dataproducts executives said the firm will begin shipping its low-end — under 300 line/min — printers this quarter.

For fiscal 1978, ended March 27, Dataproducts earnings topped $15.5 million or $2.04 a share compared with earnings of $12.1 million or $1.63 a share in 1977. The 1977 figures reflect a $1.1 million gain from the sale of a building.

Revenues climbed to $138.6 million, up from $115.3 million a year ago.

The backlog of $70 million is up 40% from a year ago. Tyson said the record backlog was a result of customers ordering early to assure delivery of products when needed.

First Semiannual Dividend

The firm instituted its first semiannual dividend last year, and the board of directors has voted to increase that dividend 50% during the current fiscal year.

Dataproducts' printer line currently accounts for 76% of the firm's revenues, with 16% realized from memory products and 8% from data communications. Tyson noted 90% of the business is OEM and said he anticipates it will remain that way for the printer sector to capitalize on the confidence of the firm's customer base.

Although the memory portion of the business has been profitable, Tyson said, he expects the firm will phase out of that sector within the next five to 10 years. While the data communications sector has grown slowly for the past five years, Tyson pointed out the telecommunications portion is now the fastest growing segment of the firm's business.

Currently, Dataproducts has the MXT-1200, a printer for use by the military, which combines communications and printing ability, Tyson said.

While the printer business will remain OEM, Tyson said communications products would probably allow Dataproducts an entry into the end-user market.

Annual Growth at 51%

Commenting on the company's performance for the past five years, Tyson said the annual growth in earnings is 51%, with revenues stable at 20%. However, he predicted earnings will not continue to grow at such a rapid pace, but will probably level off, reaching equilibrium with revenues somewhere in the 20% to 30% range for the future.

Dataproducts recently placed 455th on the second 500 of the Fortune list.

Although the slower printers will carve out a new market for the firm, which has concentrated until now primarily on the high-speed end of the market, earnings per unit sold will be less, Tyson said. "We feel we have to drive prices way down to remain competitive; the market is very elastic," he added.

"Our labor costs are up, but component costs are down and we are learning to automate production and take advantage of labor cost savings by manufacturing in Hong Kong and Puerto Rico," Tyson explained.

Tyson reported Dataproducts currently holds 60% of the high-speed OEM market, estimated at $400 million annually. This, according to Tyson, figures out to one-third of the total OEM printer market, which is divided into two sectors — printers over and printers under 300 line/min.

Sales to the minicomputer sector of the market accounted for 35% to 40% of the company's sales.

The limiting factor in the market, Tyson asserted, is that there hasn't been the applications power to go along with the lower cost of hardware, which is creating a demand for product.

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New Registrations

DATAPOINT CORP., 7900 Callaghan Road, San Antonio, Texas 78229, filed to register 500,000 shares of common stock. No underwriter is involved.

STORAGE TECHNOLOGY CORP., 2270 S. 88th St., Louisville, Colo. 80027, a data storage subsystem firm, has filed to register 1,100,000 shares of common stock. Underwriters: Smith Barney, Harris Upham & Co., Inc. and L.F. Rothschild, Unterberg, Towbin.

MODULAR COMPUTER SYSTEMS, INC., 1650 W. McNab Road, Fort Lauderdale, Fla. 33309, a real-time computer and systems firm, has filed to register 680,000 shares of common stock. Underwriter: L.F. Rothschild, Unterberg, Tobin Hambrecht & Quist.

PERTEC COMPUTER CORP., 12910 Culver Blvd., Los Angeles, Calif. 90066, a mini- and microcomputer firm, has filed to register 1,000,000 shares of common stock. Underwriters: Merrill Lynch White Weld Capital Markets Group.

INFORMATION MAGNETICS CORP., 485 S. Fairview Ave., Goleta, Calif. 93017, has filed to register 155,000 shares of common stock. No underwriter is involved.

TELENET CORP., 1050 17th St. N.W., Washington, D.C. 20036, a packet-switched data communications firm, has filed to register 440,000 shares of common stock. Underwriter: L.F. Rothschild, Unterberg, Towbin.

RANDAL DATA SYSTEMS, INC., 365 Maple Ave., Torrance, Calif. 90503, filed to register a minimum of 187,500 and a maximum of 300,000 shares of its capital stock. C.L. McKinney & Co., Inc. will act as managing underwriter.

NATIONAL COMPUTER SYSTEMS, INC., 4401 W. 76th St., Edina, Minn. 55435, has filed to register 400,000 shares of common stock. The offering will be made only by means of a prospectus.

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If you feel you are qualified and want to get in on an excellent opportunity with one of New England's fastest growing companies, please contact us.

Data Base Implementors

Want to build a major new DBMS? Get into page formats, indexing schemes, and pointer arrays! Find out how to optimize search paths for complex queries. Program and test algorithms for storage and data structure access. Learn why integrity, protection and data independence are central concerns of our DBMS! If you think that you can benefit from working with some of the best DBMS designers in the world and are already a top-notch implementor of system software, talk it over with our Manager of Data Base Development.

Operating Systems Expert

"In the land of the blind the one eyed man is king!" Seriously, can you design and implement a working-set page algorithm for our virtual memory based operating system? Are you up on resource allocation schemes, performance monitoring, and inter-task communication? If you have first class OS design experience under your belt and want to work with the group that put together the most advanced virtual memory based operating system in its class, contact our Manager of Operating Systems Development.

Computer Programming Support

This division's primary emphasis is on software applications development. Positions listed are urgent needs; however, we are interested in quality applicants in all areas of applications software.

Corporate Data Processing

This group has broad responsibility for development and maintenance of advanced management and operating information systems. We are seeking highly motivated individuals and prefer those that are experienced in the use of COBOL and/or PL/1. IMS or other DBMS experience would be a plus. We have a strong preference for "shirtsleeve" analysts, i.e. individuals who can design systems with direct user and management input, and then, with the assistance of strong programming support, achieve the results.

Product Support

An excellent opportunity exists for dedicated individuals with experience, to join a special group of professionals developing systems/applications software for WANG's minicomputer and virtual storage systems.

On the minicomputer line, projects include file management, database management, programming aids, peripheral support utilities, etc. We are seeking qualified, self-motivated individuals. An MS degree in Computer Science would be ideal.

On the VS product line, we are looking for qualified COBOL or PL/1 programmers for developing applications packages that will be industry specialized. Structured programming experience is important, as is a business related degree. You should be pragmatic, interested in applying computers to business applications, and interested in broad applications exposure.

Telecommunications Systems Analysts

These positions involve pre- and post-sales support, configuration analysis and installation and user training. Qualifications include: experience in the areas of modems, emulators and computer networks dealing with major account customers. Positions are available in major Eastern, Midwestern and Western cities.

Programmers Telecommunications and Networking

If you are experienced in software systems implementation and are looking for a way to expand your career horizons, Wang has opportunities for you to grow.

We currently have positions available involving design, implementation, and continued enhancement of telecommunications and networking software. The individuals we are seeking will be capable of working independently and as a member of a team.

We also have positions involving the design and development of systems software for data communications between computer and word processing systems.

If you share our increasing interest in communications and network products, please contact us.

Word Processing Industry Marketing Manager

Our Industry Marketing Group has a need for a manager experienced in creative new marketing techniques and concepts and dealing with major Fortune 500 accounts. You must also have the ability to make major corporate presentations on industry marketing of word processing systems. Solid industry know how in vertical marketing techniques, data communications development planning and *organizational* experience is a must.

A minimum of 8-10 years experience in the computer industry is required, with at least 5 years of marketing and sales responsibilities. A Bachelor's degree is required, with an MBA or equivalent preferred.

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Vitek Systems, Inc., a new subsidiary of McDonnell Douglas Corporation, has openings in the following areas:

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These positions will be located in suburban St. Louis, Missouri. Please send your resume, including salary history to:

W. B. Kellenberger
Section Manager,
Professional Employment
Department CW-08V
P.O. Box 516
St. Louis, Missouri 63166

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Data Processing Professionals

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Fireman's Fund, a leader in the Insurance Industry, is seeking talented EDP professionals to join us in our modern Computer Center where the latest state-of-the-art facilities exist (including our advanced three 370/168's MP MVS systems). Openings are available in the following areas:

Sr. Programmer/Analysts
— Advanced Systems

Positions require 2-6 years' total EDP experience with meaningful background in two or more of the following:

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(6) Regression testing methodology
(7) Software evaluations.
(8) EDP Standards and systems assurance

These positions are in a creative, innovative atmosphere and require the following — excellent communication skills, COBOL (shop language), PL/1 and/or MK-IV, TSO and/or Superwylbur.

Systems Programmers

Positions require 3 years' Systems Programming experience, strong ALC skills, and a good understanding of MVS and systems 370 concepts. Experience in MVS internals, SMP, measurement and tuning, dump analysis, design and implementation of system software highly desirable.

TP Systems Programmer

Position requires 3 years' Systems Programming experience with primary emphasis on teleprocessing and systems, ALC and analytical skills, and a good understanding of MVS and System 370 concepts. Experience in teleprocessing, access methods (BTAM, VTAM), 370S software, IMS, INTERCOMM, dump analysis, and design and implementation of system software highly desirable.

• INTERVIEWS CONDUCTED LOCALLY •

If you are interested in pursuing a career in a progressive environment where your talents will be recognized and utilized, please call collect (415) 485-6096 weekdays, 8 AM to 5 PM Pacific Daylight Time, or send your application and salary requirements to Jose Garay, Employment Representative, Dept. CW-730, 1600 Los Gamos Drive, San Rafael, California 94911. We offer excellent benefits and a generous relocation policy.

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Programmer/ Analyst

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Data Center Manager
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The University is seeking an assistant director for Operations to manage the computer operations, data entry and production control components of the administrative data processing department.

Applicant must have at least 5 years of data processing experience with medium to large scale IBM systems, operating under VM and DOS/VS and must have at least 3 years of high level management experience in all aspects of production oriented computer operations. It is essential that applicants have excellent communicating skills, technical competency in DBMS and/or on-line environments and demonstrated management skills. Exposure to higher education applications is desirable. Applicants with bachelor's degree in computer related disciplines are preferred. Total compensation is quite competitive as we offer an excellent benefits package and a salary in the high teens.

If you feel you are qualified, please send a resume and the names of 3 references, by August 9, University of Vermont, Box 57E, Burlington, Vermont 05401.
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Rapidly expanding upper New York State Bank Data Processing Corporation has immediate openings for two Customer Support personnel. Programming and/or systems experience on NCR Century/Criterion hardware most helpful. CIF/FOCUS or CI/RF and commercial bank experience a must. Individuals should have the ability to communicate effectively with our client banks, in the solutions to their problems and the application of new data processing services.

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We are currently seeking an individual with experience in FORTRAN, Assembly and BASIC programming languages. Experience with Tektronix 4051 Graphics System helpful. BS or MS degree preferred, however, commensurate experience acceptable.

We offer a fine salary and excellent fringe benefit package. Interested persons should contact: Mr. Terry York, or forward their resume in complete confidence to,

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DIRECTOR OF DATA PROCESSING CENTER

(Readvertisement) Master's in BDP or related discipline. Three years experience in management/administration. Minimum two years' experience in programming and systems analyst. $19,500 - $24,500. Effective January 1978. Send resume by September 1, 1978, to Jane C. Frank, Assistant to the Dean, Berkshire Community College, Pittsfield, MA 01201. Affirmative Action/Equal Opportunity Employer.

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Our new data processing systems make "easy upward migration" a reality. So do these career opportunities in Wichita.

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And you'll find more than a fast paced, "ample-room-at-the-top" environment in Wichita. Wichita is non-stressful . . . relaxed . . . neighborly. With a metropolitan population of almost half a million, it is still a place where in 10-15 minutes of light traffic driving you can be home in a fine community. A place where you can walk safely at any hour of the night and soon know hundreds of your townspeople by their first names.

Our career opportunities are almost as wide as Kansas itself.

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Require BS/MS in CS with relevant experience.

Senior Programmers/Systems Analysts

These are high-level positions, several involving group leadership and technical direction. Development of software architecture and OS implementation for new-generation minicomputer systems; maintenance of support tools for existing systems. Experience in real-time systems design.

Programming Consultant/Analysts

These positions call for extensive experience (5-10 years) in OS design to provide technical leadership in division software design projects.

Programmer Analysts

Provide support for utility module, including designing, coding, documenting, and testing for source/functional compatibility. Will plan procedures and monitor through release. Or, alternatively, do test planning, performance measuring, integrate COBOL for small computers, and help lead design effort in system simulation.

Please send resume indicating both position of interest and salary history, to: Mr. Jerry Long, Manager, Professional Recruitment, Dept. CW-710, NCR Corporation, Engineering & Manufacturing, 3718 N. Rock Road, Wichita, KS 67228. (316) 687-6192.

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SYSTEMS ANALYST
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Our Scientific Computing Department has need for a Computer Analyst to implement information storage/retrieval and project reporting/control applications using data base management systems. Successful candidate will be involved in initial problem definition, systems analysis, programming, check out, implementation, and will be working closely with the parent company and many subsidiaries at all management levels.

Requirements are a degree in computer science or math, a demonstrated proficiency in designing and developing complex systems on large scale computers and a minimum of 2 years experience with programming languages such as FORTRAN or ALGOL.

Northern Natural Gas Company is a diversified company involved in a broad class of activities ranging from transmission of natural gas to the operation of a large petrochemical complex. Northern offers challenging professional positions, solid career advancement opportunities and an excellent benefits package. Please send resume with salary history to: Jim LaHood.

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REHAB GROUP INC. offers an excellent benefits package and advancement. Below are listed a few of the positions that are available now in the Washington, DC, Northern Virginia and Bethesda, Maryland suburbs. If you have 1 or more years experience in OP we also invite you to send your resume.

SENIOR IMS PROGRAMMER/ANALYSTS

(OB/DC) utilizing MFS using IMS, COBOL in OS/MVT operating environment. Must have 2-3 years experience with IMS, including systems design, development and successful implementation. Areas of IMS applications include: Accounting Systems, Inventory Control, Project Management, Production Control and Inventory Tracking.

SENIOR CICS PROGRAMMER/ANALYSTS

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2 years experience in any of the following configurations: 360/370 MVT-MVS, Umivac 1108 COBOL, H-6000 COBOL. All positions require solid JCL and Utilities background.

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DATA COMMUNICATIONS SPECIALIST

This senior level position is available for an BTAM/VTAM experience software professional to support our 370 EP/NCP, CICS, IMS network. Experience should include installation, maintenance, and enhancements of TP monitor. Familiarity with PDP-11, TCOMM 7 Communications Systems is a plus.

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Minimum 2+ years experience in design and implementation of on-line CICS applications systems. Solid background in COBOL and ALC required.

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CSC

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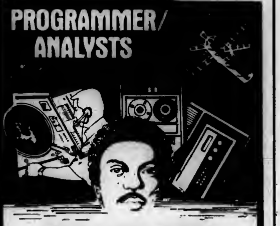

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Data Processing

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Systems Analyst

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Excellent professional growth opportunity for an individual with a broad background in computer technology, including on-line environment, data base design, data structure, access techniques and telecommunications.

You should have experience with high level programming languages including DOS/VS - COBOL - DBOMB - CICS/VS - VSAM - DMS and DL-1. Your initial responsibilities will be to provide technical support in these areas.

We can offer you an excellent starting salary and a full range of benefits. If you are interested in a challenging opportunity and earnings potential only limited by your ability and performance then send your resume with your salary history and/or salary expectations to:

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OPERATING SYSTEMS/ SOFTWARE SUPPORT

CAREER OPPORTUNITIES
University of California's
LOS ALAMOS SCIENTIFIC LABORATORY

OPPORTUNITIES IN

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Will provide technical direction for group projects including operating system maintenance, enhancement, and development for the Laboratory's large-scale computer, in addition to providing other user services. Will assist in group administration. Must have B.S. or advanced degree in mathematics, physics, computer science, or related scientific field; extensive operating systems backround (may be at utility level) with proven project management ability; a minimum of one year's experience with one or more of the specific large-scale computers listed above; and demonstrated ability to work successfully with project management personnel and with users.

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Will work as a member of a team responsible for the FORTRAN processors on all major computers in the CCF. Must have a bachelor's degree in a technical discipline; five years' experience in operating systems programming; familiarity with CDC RUN or FTN family of compilers; efficiency in COMPASS and assembly language usage; and demonstrated ability to work as a team member.

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Will develop and maintain utility programs for computer operating systems and will interact with systems programmers, CCF consultants, and users in the analysis and solution of software problems. Must have B.S. in computer softwar
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- Analysis of user workload profiles to derive alternative optimization efforts
- Development of performance models to predict the impact to system capacity of hardware configuration changes
- Definition and monitoring of performance measures which provide a basis for trend analysis to assess computer system performance.

SDC Integrated Services, Inc. has excellent company benefits, including a generous relocation package to assist you and your family in moving to the Research Triangle Park area. For more information, call Donna Faison COLLECT at (919) 541-3536 or send resume in confidence to SDC Integrated Services, Inc., P.O. Box 12314, Research Triangle Park, North Carolina 27709.

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System Development Corporation

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PROGRAMMERS

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Operate computer facility in small liberal arts college. Director reports to Assistant Academic Dean, works with Director of Computer Skills program; develops academic computer uses; develops and maintains administrative programs. One person facility with student assistance. Bachelor's degree and 2 years' experience with DEC, PDP-11 RSTS/E required. BASIC-PLUS mandatory; COBOL, FORTRAN, MACRO-11, CAI experience desirable. Rank and salary dependent on qualifications. Immediate opening. Send vita to Dr. O. Coon, Chairperson, Mathematics, Wheeling College, Wheeling, WV 26003. EO/AA.

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To qualify you must have experience with one or more of the following: time sharing (preferably GE Mark III), DEC RT-11, Fortran or Basic. You must be able to work quickly and independently using broadly stated functional requirements to produce programs that are foolproof, friendly, and easy to use by clerical and management personnel.

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data processing

SR. PROGRAMMER

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Minority and women candidates are encouarged to respond. If you feel you have the necessary qualifications for this position, please submit your resume including salary requirements (consideration will be given only to those who furnish salary history).

Mr. Chris Bardwell
Director of Employment & Compensation
or contact
Jay Ammerman 947-4114

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If you are ready to make that commitment and want to become a part of our team, send your resume and salary history in confidence to:

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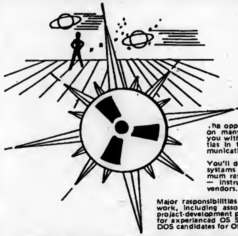

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D.P. OPPORTUNITIES

If you are satisfied with your job, salary, company benefits, etc. you are in the wrong section of this publication, turn back to the editorials. If not, we have some exciting opportunities that may be the answer to your stymied career.

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Head up new data processing division for Fortune 100 corporation. Should possess good written and oral communications skills from manufacturing environment. Prefer large mainframe IBM experience in business and industrial applications.

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DATA PROCESSING

DIRECTOR

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CW Box 1632
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The University of Delaware Computing Center is seeking two qualified candidates to join its SOFTWARE/DATA COMMUNICATIONS GROUP. The first position involves creating and modifying all software for a large-scale Burroughs B7700 used for both batch and timesharing services. The second position involves offering assistance and developing software to be used in minicomputer-based systems used in a laboratory and office automation environment, i.e., PDP 11 using UNIX, HP21MX. Applicants for either position should possess a B.S. degree in computer science, natural science or engineering, and have experience in development and modification of operating systems, language processors, and support utilities. Projects involve creativity in a team of highly motivated people involved with multiple-computer architectures. UDCC maintains a multi-host regional network consisting of B7700, DEC-KL10, and CYBER 173 mainframes, and an interconnected multiple PDP 11-based system acting as RJE's, and lab automation computers. Salaries are competitive and based on qualifications.

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Robert W. Rahe, Manager
Data Communications/
Software Systems
Computing Center
University of Delaware
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SYSTEMS PROGRAMMER

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You must be capable of providing technical guidance, planning, coordinating and directing the implementation of performance and development projects.

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Position requires BSEE and experience with terminals and multiplexers. Qualified applicants must be capable of circuit and systems analysis, including LSI and microprocessor techniques.

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BSEE BS Physics and 3 to 5 years experience with discreet components. Position will involve you in all facets of component engineering from parts selection through qualifications, evaluation and support engineering.

SYSTEMS PROGRAMMERS

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Applicant must have 4-5 years broad systems engineering experience. Responsibilities will include analyzing requirements, providing technical assistance, and obtaining specifications to establish and interpret design criteria. Engineering Degree required.

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SENIOR ENGINEER

Position requires a BSEE or equivalent experience. Microprocessor based design experience is required. Familiarity with logic design, CMOS, and T2L logic families, RMOS, RAMS, PLAS would be a plus.

PROGRAMMERS

You should have a minimum of 2 years real-time assembly language experience with mini- or microprocessors. Communications teleprocessing, remote batch IBM 3270/2260, Uniscope 100/200/400, VIP 7000 exposure helpful.

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To fully explore the career potential that awaits you at Raytheon Data Systems, please call Marthe Polachi, at 1-800-225-9874, Ext. 2229, or mail your resume with salary history, in complete confidence to her at the address listed below.

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Systems Programmers

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Our vice presidents personally hire each programmer/analyst (over 100 will be in 1978) because they know that a professional service firm's FUTURE IS YOU.

Immediate openings including Miami, Houston, Washing, D.C., Baltimore and Philadelphia areas. Call collect or send resume with current salary requirements to:

Mrs. Donna Koterba

Data Technology

6611 Kenilworth Ave., Suite 413
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Toll Free 800-638-0911

SOFTWARE COMPANY SEEKS ANALYST PROGRAMMERS MARKETING REPRESENTATIVES

COBOL or IBM 370 ASSEMBLER experience required. Marketing Representative should be experienced in software peckages sales. Send Resume to:

GENERAL COMPUTER
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P.O. Box 5148
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(205) 539-9492

PROGRAMMER

Grow soon, or grow bored. Technicians often feel their careers have degraded into monotonous treadmill jobs. Bright ideas are valuable in the San Francisco area. If you are good, there is a good chance that our client needs you. Right now.

You will need 5 years in DP. Commercial applications background. Knowledge of COBOL. Exposure to IBM S/370 hardware. Familiarity with any of the following will be helpful: JCL, ALC, IMS-DB/DC, and structured programming. Starting salary up to $21,000. For details, please call: 415/781-5260.

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CPU

Syracuse University

Programmer/Analysts

Administrative Data Processing

We are looking for Programmer/Analysts at all levels of experience to develop and support administrative application systems for the University in such areas as Accounting and Finance, Admissions and Registration, Payroll/Personnel, Alumni and Development, and Budget. The department utilizes a 2 megabyte S/370 148 computer running OS/VS1. New projects being developed involve the use of CICS and a 3790 Communications System.

Applicants for this position should have one or more years experience in a S/370 OS/VS shop using COBOL or PL/1. Some analysis and design experience is required as is a working knowledge of OS JCL. Online systems or 3790 experience is a plus.

In addition to the superior technical environment and challenge, we offer a career path with excellent opportunities for advancement and starting salaries ranging from $13k to $20k+ depending on experience and ability. We also offer excellent fringe benefits that include liberal tuition assistance and four weeks paid vacation. Please submit your resume including salary history in complete confidence by August 18, 1978 to:

Syracuse Univeristy

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Skytop Office Building
Syracuse, New York 13210
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Large Los Angeles company seeks top notch, seasoned manager to:

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- Improve management information system.

Only candidates with track record in above who are self starters and aggressive will be considered.

Excellent pay and fringe package. Send resume and salary requirements to CW Box 1638, 797 Washington St., Newton, MA 02160

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Progressive S/3 M 15-D shop is seeking an additional analyst/programmer. Applicants must have a minimum of 2 years programming experience including CCP and RPG II. Starting salary: $14,080 to $15,330. Send resume to Personnel Office, Black Hawk County Courthouse, Waterloo, Iowa 50703.
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Fairfield County, Conn.
Programmer/Analysts
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2 or more years COBOL
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The A.C. Nielsen Company, the world's largest market research company, is seeking an experienced assembly language programmer for our Florida office. We offer significant challenges to the individual who is a self-starter, motivated and talented.

Send resumes in complete confidence to:

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378 Patricia Ave.
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SYSTEMS PROGRAMMER: ALC, COBOL, VSAM, CICS and Teleprocessing Systems

APPLICATIONS PROGRAMMER: COBOL, DOS-VS

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Send resume, salary history and requirements to our personnel department

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SYSTEMS ANALYST

PROGRAMMER ANALYST

SYSTEMS PROGRAMMER

SYSTEMS ANALYST
3-5 years experience large scale, varied systems; On-line and data base oriented.

PROGRAMMER ANALYST
Minimum 2 years ANS COBOL programming and analysis experience.

SYSTEMS PROGRAMMER
Minimum 2 years experience S/370 OS environnment. Will assume full responsibility for OS/VS 1 operating system.

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Pic'n Pay SHOES Charlotte, N.C. 28261
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Rapidly growing data center serving the library community in the southeast seeks experienced programmer analyst. Qualifications: proven experience; thorough knowledge of COBOL; supervisory, oral and written skills; degree preferred; knowledge of Burroughs hardware and library applications a must. Please send resume with current position and salary history by August 14th to:

Southeastern Library Network, Inc.
615 Peachtree Street, NE #410
Atlanta, GA 30308
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SCIENTIFIC PROGRAMMER

FLORIDA OPENING

Due to the continued growth of EMR TELEMETRY, we are looking for a person with specialized experience in RSX-11M and computer graphics. The ideal person will possess the following qualifications:

- RSX-11M
- In-depth working knowledge of systems exect. and I/O services
- Expertise in scientific graphic applications, esp. with Raster Scan CRT's
- Driver level software knowledge
- Working knowledge of FORTRAN and MACRO 11
- 4 to 5 years experience with more than one computer system.

If you are interested in a company that offers a dynamic growth opportunity and excellent working environment, send your resume to W.F. Bozeman.

EMR TELEMETRY
PO BOX 3041
SARASOTA, FLORIDA 33578

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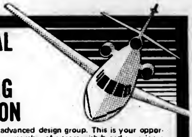

We are building an advanced design group. This is your opportunity to become a key member of a team with broad experience to state-of-the-art airborne technologies.

AIRBORNE COMPUTER PROGRAMMER/ANALYST

Experience in system integration and real-time command and control of airborne sensors.

AIRBORNE DISPLAY DESIGN ENGINEER

Digitial scan converter experiance required.

AIRBORNE SYSTEM INTEGRATION ENGINEER

Integration of sensor based electronic systems into aircraft is essential.

AIRBORNE COMPUTER DESIGN ENGINEER

Experience designing real-time hardware interface and interfacing computers with sensor equipment is required.

FJC has an excellent salary and benefits package. For further information and consideration submit resume with salary history or call:

Ed Campbell (800) 643-8253 X270

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Jobs For Veterans Company

COBOL

PROGRAMMER/ANALYST

position available in Virginia's beautiful Shenandoah Valley. DataCorp of Virginia seeking experienced individual with knowledge of RPG & ALC in DOS & DOS/VS Systems. Send resume & salary requirements to: EMPLOYMENT MANAGER, ROCKINGHAM NATIONAL BANK, RNB CENTER, HARRISONBURG, VA 22801. AN EQUAL OPPORTUNITY/AFFIRMATIVE ACTION EMPLOYER.

COMPUTER PROGRAMMER

Indian River Community College, Fort Pierce, Florida. Position requires at least two (2) years experience in BAL and COBOL with background of on-line applications and systems, preferably on 370/125 series. Starting salary is $11,700 with excellent fringe benefits. Phone Personnel Office at (305) 464-2000, ext. 219 or write 3209 Virginia Avenue, Fort Pierce, Florida 33450.
We are an Equal Opportunity Employer.

SYSTEMS ANALYST INSURANCE INDUSTRY

Growing insurance company headquartered in Northern Ohio seeks a professional analyst with 3-5 years of programming and systems experience in a life, casualty or accident and health organization. This is an exciting opportunity to play a lead role in new systems development projects during the next 2 to 3 years. We can offer you exposure to all aspects of insurance administration, marketing and financial systems, and direct working contact with senior line management in these areas. We offer a starting salary up to $21,000 per year, commensurate with experience, excellent benefits, and we will pay relocation expenses. For consideration, send your resume including salary history in confidence to CW Box 1634, 797 Washington St., Newton, MA. 02160.

PROGRAMMING

The University of Delaware is seeking candidates for openings in the following areas of administrative data processing.

Senior Programmer Analyst(s) — responsible for the design, programming, and implementation of university administrative computer applications with some experience with Burroughs equipment. Minimum qualifications require equivalent of a bachelor's degree with 3 to 4 years' effective experience.

Programmer Analyst(s) — responsible for the design, coding and testing of university administrative programs including systems testing, user training, and preparation of final documentation with some experience wth Burroughs equipment. Minimum qualifications require equivalent of a bachelor's degree with 1 to 2 years' effective experience.

These positions represent an opportunity to work within a centralized university computing center utilizing advanced teleprocessing and data base techniques on a large scale Burroughs B7700 system.

Submit resume including salary requirements by August 25, 1978, to:

Daniel J. Heimerich
Assistant Director
Administrative Systems
Computing Center
University of Delaware
Newark, DE 19711
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MANAGER-SYSTEMS DATA PROCESSING

Evansville, Indiana Location

Distribution Industry

Major "fortune 500" Corporation has immediate opening for experienced Systems Manager, degreed, knowledgeable in Cobol and R.P.G. You should be proficient with remote data entry, and have some background in accounting and inventory control systems. You must have a minimum of 5 years indepth experience. Distribution industry experience a valuable plus.

This is a real career opportunity to step up to the ranks of a major company with excellent career path. You can expect a salary in the mid to high 20's, plus a comprehensive company sponsored fringe benefit package. Qualified applicants should send resume and complete salary history to:

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THAT'S RIGHT, + 20%! Our New England (No State Income Tax) based client knows they have to invest up front in order to attract and keep top notch professionals, especially during the next several years while they develop multiple computer communication networks for their 450 (and still growing) field office operation.

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PIONEER THE STATE OF THE ART in one of the several client openings described below:

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Responsible for achieving and maintaining a high level of technical expertise which can be drawn upon by members of Information Systems and Information Processing for defining and accomplishing activities which result in operational improvements; and for contributing technical guidance to the process of future hardware and software selection. Technical knowledge of current and proposed hardware/software concepts within the DP industry. High level of oral and written communication ability.

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(Senior Programmer)

Will advise and counsel, assist and train programmers in H6000, COBOL/IDS environment. As DBA, you will review with management overall performance against previously established goals and objectives. Interest in file structuring techniques and other data management areas sought. Familiarity with time-sharing will be helpful.

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Identify and remove computer performance bottlenecks, measure the behavior of key performance elements and support the planning function by providing current operating data and estimates of machine capacity. You should possess multiple computer language knowledge as related to large scale computers. Be familiar with hardware/software monitors, benchmark techniques and hardware architecture. Have high levels of oral and written communication skills.

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data processing

Headquarters Marketing Support Specialist

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Amdahl could be the right place for you.

We currently seek an individual to work as part of a team with major responsibilities to include benchmark preplanning with customers and interface at the management level. This is an excellent opportunity for a technically rounding experience if you have a systems programming background that includes MVS internals. You should have good communications skills and experience as a team member involved in performance measurement and tuning.

Qualified candidates are invited to respond by indicating 330-E on their letter or resume and directing it to Phil Beckhelm, Amdahl Corporation, P.O. Box 5070, Sunnyvale, CA 94086. Or call him collect at 408/746-6165. We are an equal opportunity employer.

amdahl

SYSTEMS PROGRAMMER

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- RSX-11
- Meth Analysis
- 8080

You may reach us by calling
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EMR TELEMETRY

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Requires experience using APL. Knowledge of any of the following is a plus: Actuariel Science, CMS, VSAM, INQUIRE.

Excellent sterting salery and generous benefits peckage. For immediate consideretion, send resume with salery history to Sandre Stevenson.

BCS BOEING COMPUTER SERVICES COMPANY
A Division of The Boeing Company

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Free Employment Service
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Cherry Hill, New Jersey 08002
(609) 667-4488

RSVP SERVICES, Dept. C
Suite 300, Dublin Hall
1777 Walton Road
Blue Bell, Penna. 19422
(215) 629-0595

RSVP SERVICES
Employment Agency for Computer Professionals

CSC

PROGRAMMER/ANALYSTS

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These positions are in support of our Mission Support, Scientific and Applications and Goddard Real-time Systems Projects with the NASA Goddard Space Flight Center located in the Maryland Suburbs of Washington, D.C.

CSC offers competitive salaries and a complete benefits package. For further information, please send resume or call:

Staffing Department
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COMPUTER SCIENCES CORPORATION
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If your recent skills include ALC, COBOL, insurance design, installation or project management with outside packages or homegrown systems, contact JACK EDWARDS to scheule a personel interview.

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(703) 821-0688
Insurance Personnel

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New position to guide County Department updating information and records processing. Waukesha County is a suburban setting in the Milwaukee Metro Area with excellent recreational and cultural activities. Salery of $17-$21,000, plus employee benefits. Requires bachelors degree in bus. or public admin., accounting, ind. eng. or mgt. and 5 years experience in systems analysis. Master degree may substitute for 1 year of experience. Send resume to Waukeshe County Department of Personnel, 515 W. Moreland Blvd., Waukesha, WI 53187. Phone: (414) 544-8044. "An Equal Opportunity Employer."

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SOFTWARE MANAGERS

Do you want complete project control and customer interface? Your major responsibility is to direct a team of software professionals from inception of a system to delivery. A technical degree and experience with digital process control systems is desirable.

APPLICATION PROGRAMMERS

If you are "button holed" in a job, this is your opportunity to get hands-on exposure to the entire system. Openings exist in development (micro and minicomputers), applications, system design, man/machine interface, communications and support programs. A technical degree and 2 years experience with FORTRAN or ASSEMBLY in one of the above areas is desirable.

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If you are tired of finishing someone else's work, get in on the ground floor in the new development of systems and applications software. Work in assembly language on new mini or microcomputer projects involving operating systems, man/machine interface and data acquisition.

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Dickerson Road—North Wales, Pa. 19454
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SYSTEMS ANALYSTS AND PROGRAMMERS
Texas Gulf Coast Area

Intermedics, Inc., a rapidly expanding manufacturer of Cardiac Pacemakers is looking for analysts and programmers for its Freeport, Texas operations.

Current positions require 3-5 years of experience preferably in financial and scientific applications utilizing BASIC, COBOL, DIBOL and FORTRAN.

Experience with D.E.C., Univec and Microdata would be useful.

If you would be interested in one of these challenging positions and would like to live in the sunny south, send a confidential resume to:

Personnel Manager
Intermedics Inc.
P.O. Box 617
Freeport, Texas 77541
Equal Opportunity Employer

Assistant Vice President/ Software Development

The top post for direction of software development for a major computer systems manufacturer.

You will assume corporate leadership of software planning, development, and management for all divisions of a full-line computer manufacturer, reporting to the vice president of corporate R&D. Under your direction will be all software research, design, standards, quality maintenance, and staffing activities for a multi-million dollar program.

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Obviously, we are seeking the person who is in the front rank of the software profession. The salary and supplements are fully commensurate with the primary importance of the post.

Please communicate in confidence to

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Bob Tamer
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500 E Carson Plaza
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QA of DBMS systems. Review of product specifications. Development of product test plans/procedures. Design and development of new QA tools.

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MRI Systems Corporation is a growing international company that is an acknowledged leader in the data base field. Our products (SYSTEM 2000R, TP 2000^R and CONTROL 2000^R) and our services continue to receive recognition from customers and professional organizations. This employment opportunity is at the corporate headquarters in beautiful Austin, Texas.

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Personnel Manager
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mri
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12675 Research Boulevard
P.O. Box 9968 (Mailing Address)
Austin, Texas 78766
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OPPORTUNITIES IN PHOENIX

PROGRAMMER ANALYSTS

Armour Dial Company, the consumer products subsidiary of The Greyhound Corporation, is currently searching for experienced data processing professionals to join our corporate MIS staff in Phoenix.

Our specific needs are in:

Data Base/Technical Support - Requies 3-5 years experience in data base administration and developing standards and procedures. TOTAL DBMS experience required. BS in information sciences preferred.

Manufacturing Systems - Requires 3+ years experience in MRP, Bill of Materials, cost accounting and inventory control. TOTAL DBMS a definite plus. DSBA preferred.

These opportunities require experience with large scale IBM equipment in an OS environment using COBOL. Heavy user interface makes excellent interpersonal skills essential.

If you are looking for an opportunity to grow as an MIS professional while contributing to the success of products like Dial Soap, Tone Soap and Armour Star canned meats send us your resume. Tell us what you've done, your career objectives and salary requires.

John Marques Jr., Personnel Department

ARMOUR-DIAL COMPANY

111 W. Clarendon Phoenix, AZ 85077

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SYSTEMS PROGRAMMERS

"RSX-11M"

Fluor Corporation, a dynamic and internationally respected leader in the Engineering and Construction field, has immediate openings for RSX-11M Systems Programmers

Responsibilities will be in the areas of development and support of RSX-11M Operating System using PDP 11/70 and 11/34 mini computers. Two to five years of direct RSX-11M systems programming experience is required

Our employees enjoy excellent benefits which include profit sharing and a savings investment program. Positions are located in the innovatively designed facility in the Newport Beach area

Please send resume to:

Larry Turchick, Dept. LAT/056

FLUOR

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3333 Michelson Drive, Irvine, California 92730
Equal Opportunity Employer M/F

SYSTEMS PROGRAMMER

CONNECTICUT

Dorr-Oliver is a NYSE listed international corporation involved in research, design and development and marketing of process equipment for the chemical, environmental, minerals, pulp/paper and food industries.

Growth of our Stamford, Connecticut headquarters data center has created an outstanding opportunity for a Systems Programmer. Broad based responsibilities include functioning in the areas of operations, systems development and programming utilizing expertise in operating systems software. Three plus years experience in VM/370 and/or DOS/VS Power/VS environment required.

We offer an excellent salary, comprehensive benefits and relocation assistance. Interview arranged at your convenience. Send resume or detailed letter including salary history to:

Sue Norton, Employment Mgr.

DORR-OLIVER

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77 Havemeyer Lane, Stamford, CT 06904
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Software Professionals:

This may persuade you to join ADR...

The Company

ADR is the #1 software products company in the world. Founded in 1959, we have software installed at over 8,000 computer sites, more than any other independent software company. We are large enough to be stable and respected, small enough to be informal, with lots of room for recognition and advancement. We currently employ over 280 people and our annual sales exceed $20,000,000. ADR has 8 branch offices in the United States and is represented in 35 foreign countries

The Products

ADR's diverse product line is state-of-the-art. Our systems range from on-line programming systems to language translators; from text processing to performance measurement. IBM technological advances are usually heralded by new ADR products. ADR software products are rated #1 in the 1977 Datapro survey — surpassing every other company in the number of products (4) honored by Datapro.

The Environment

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If you'd like to chat further with CSC Technical Director Lynn Hopewell personally, telephone him toll free at (800) 336-0173. He'll welcome your call.

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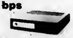
2400 bps 	**MODEM 2200/24** Half or full duplex operation over dial or dedicated facilities	$1780 $60/mo.*	**$725** **$29/mo.***
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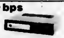
7200 bps 	**MODEM 4800/72** Dedicated line with optional multiport operation for up to three 2400 bps channels	$6900 $165/mo.*	**$1995** **$80/mo.***
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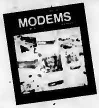

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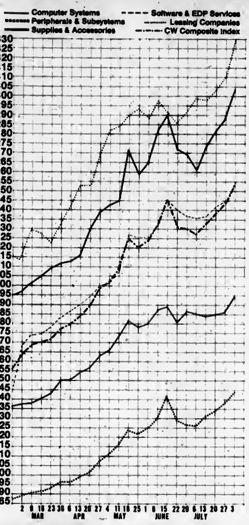

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	1978	1977
Shr Ernd	$1.04	$.45
Revenue	16,597,000	7,348,000
Tax Cred	......	78,000
Earningp	1,311,000	590,000

DECISION DATA COMPUTER
Three Months Ended May 27

	1978	1977
Shr Ernd	$.11	$.08
Revenue	8,297,000	8,522,000
Tax Cred	214,000	82,000
Earnings	399,000	282,000
6 Mo Shr	.14	14
Nevenup	17,525,000	16,415,000
Tax Cred	300,000	240,000
Earningp	551,000	617,000

NATIONAL DATA
Year Ended May 51

	1978	1977
Shr Ernd	$.71	$.52
Revenup	35,800,000	a30,697,000
Earnings	3,144,000	2,340,000
3 Mo Shr	.20	.15
Revenup	8,496,000	a8,292,000
Eprnings	885,000	673,000

a-Restated.

NATIONAL SEMICONDUCTOR
Year Ended May 31

	1978	1977
Shr Ernd	$1.72	$.78
Revenue	494,336,000	387,336,000
Earnings	22,497,000	10,184,000
3 Mo Shr	.48	.25
Nevenue	133,226,000	96,272,000
Earnings	6,339,000	3,215,000

TELEPILE COMPUTER
Three Months Ended Dec. 31

	1977	1976
Shr Ernd	......	$.09
Revenue	$2,506,186	1,710,853
Earnings	(126,365)	116,357

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TRADE QUOTES

Computerworld Stock Trading Summary

CLOSING PAICES WEDNESOAY, AUGUST 2, 1978

All statistics compiled, computed and formatted by
TRADE QUOTES, INC.
Cambridge, Mass. 02139

CONPUTER SYSTENS

ERCN		PRICE			
		1978 RANGE 111	CLOS8 AUG 2 1978	WEER NET CHNBE	WEEK PCT CHNBE
A	ANDAHL CORP	28- 58	44 5/8	+5 5/4	+14.7
N	BURROUGHS CORP	59- 85	82 1/2	+5 5/8	+7.3
Q	CONPUTER AUTONATION	23- 39	39 1/4	+4 1/2	+12.9
N	CONTROL DATA CORP	23- 41	40 3/4	+3 1/2	+9.3
O	CAAY RESBAACH INC	21- 55	55	+7 1/4	+15.1
N	DATA 80N8AAL CORP	42- 68	67 1/2	+5 5/4	+9.3
N	DATAPOINT CORP	54- 64	64 3/8	+7 1/8	+12.4
N	DIGITAL EQUIPNENT	39- 54	55 1/2	+6 1/4	+13.2
N	BLECTRONIC ASSOC.	2- 8	7 5/8	+ 1/2	+7.0
A	ELECTRONIC ENGINEER.	11- 19	12 3/4	+ 3/4	+6.2
D	POUR-PHASE SYSTBNS	19- 36	55 7/8	+1 7/8	+5.5
N	FOXBOAD	28- 40	38 5/8	+ 1/4	+0.6
O	BENBRAL AUTONATION	7- 21	21 1/4	+1 7/8	+9.8
O	BAI COMPUTER CORP	1- 1	1	- 3/4	-42.8
N	HEWLETT-PACKARO CO	62- 88	87 5/8	+4	+4.7
N	HONEYWELL INC	43- 71	71	+6 3/8	+9.8
N	IBM	236-293	293	+19 1/2	+7.1
C	NANAGENENT ASSIST	9- 20	19 3/4	+2 5/8	+13.8
D	NICADDATA CORP	10- 18	18	+ 5/8	+2.1
O	MINI-CONPUTBA SYST	5- 8	5 1/4	+ 1/4	+5.0
O	MODULAR CONPUTEA SYS	7- 15	14 1/4	0	0.0
N	NCA	57- 62	81 5/8	+3 1/4	+5.5
N	PAIME COMPUTER INC	20- 39	30 7/8	+5 3/4	+13.8
N	PERAIN-ELNER	17- 27	28 3/4	+ 5/4	+2.8
N	AAYTHEON CO	29- 53	53 1/4	+2 1/4	+4.4
N	SPERRY RANO	33- 48	48	+5 1/8	+6.9
A	SYSTENS ENG. LABS	11- 21	18	+ 3/8	+2.1
A	WANG LABS.	12- 26	25 1/8	- 5/4	-3.1

LEASING CONPANIES

ERCN		PRICE			
		1978 RANGE 111	CLOS8 AUG 2 1978	WEER NET CHNBE	WEEK PCT CHNBE
O	ALANTHUS CORP	3- 8	6	+ 1/4	+4.3
C	BOOTHE COUAIER COAP	13- 18	16 5/8	+ 7/8	+5.5
O	CONDISCO INC	9- 25	25	+4 5/4	+23.4
A	CONNEACE GADUP COAP	1- 1	5/8	0	0.0
A	CONPUTEA INVSTRS BAP	1- 1	1 1/8	+ 1/4	+28.5
N	OATAONIC AENTAL	1- 2	1 1/2	0	0.0
A	DCL INC	3- 4	4	+ 1/8	+3.2
N	DPF INC	8- 14	15 1/2	- 1/8	-0.9
N	ITEL	16- 30	29 3/4	+2 5/8	+9.6
N	LEASCO CORP	24- 55	52 1/4	+ 1/8	+0.5
O	LEASPAC CORP	1- 4	2 7/8	0	0.0
A	PIONEER TEA COAP	5- 7	5 3/4	+ 1/8	+2.2
N	U.S. LEASING	13- 19	18 3/8	+1 5/8	+9.7

EXCH: N=NEW YOAK; A=ANERICAN; P=PHIL-BALT-WASH
L=NATIONAL; N=NIOWEST; O=OVER-THE-COUNTEA
O-T-C PRICES ARE BID PRICES AS OP 3 P.M. OR LAST BID
111 TO NEAREST DOLLAA

SOFTWARE & BOP SEAVICES

EACH		PAICE			
		1978 RANBE 111	CLOSE AUB 2 1978	WEER NET CHNGE	WEER PCT CHNGE
O	AOVANCBO CONP TECH	1- 2	1 1/8	0	0.0
O	ANACONP INC	8- 20	19 1/2	+2	+11.4
A	APPLIED OATA RES.	8- 16	14 3/4	- 5/8	-4.0
N	AUTONATIC DATA PAOC	24- 35	54 7/8	+2 1/8	+8.4
O	COLEMAN AMERICAN COS	1- 2	1 3/4	- 1/8	-8.6
O	CONPU-SBAY NETWOAA	7- 12	8 1/2	+1 1/4	+17.2
O	CONPUTEA HORIZONS	1- 5	8 1/4	+ 1/4	+4.1
O	CONPUTEA NETWORK	8- 12	11 3/4	+ 5/4	+8.8
N	CONPUTBR SCIENCES	8- 16	18	+1 5/8	+11.3
O	COMPUTER TASR GROUP	1- 4	5	0	0.0
O	CONPUTEA USABE	2- 4	2 1/4	- 3/8	-14.2
O	CONSHAAE	6- 18	18	+1 1/4	+7.4
O	OATA OINBNSIONS INC	4- 7	8	+ 3/8	+6.6
O	OATATAB	1- 2	7/8	0	0.0
N	ELBCTADNIC DATA SYS.	15- 23	19 1/4	0	0.0
D	INSYTE COAP	1- 2	E 5/8	- 1/8	-7.1
O	IPS COMPUTER NARAET.	2- 3	5	0	0.0
D	RBANE ASSOCIATES	3- 8	5 1/2	- 1/8	-2.2
O	REYDATA COAP	1- 3	2 1/8	- 1/8	-5.5
A	LOGICON	11- 16	18	+2 5/8	+19.8
A	NANABBNENT DATA	1- 1	7/8	0	0.0
A	NATIONAL CSS INC	15- 50	29 3/8	+2 5/8	+9.7
D	NATIONAL DATA COAP	7- 12	11 E/8	+ 1/2	+4.7
A	ON LINE SYSTENS INC	17- 26	24 1/4	+ 3/4	+5.1
N	PLANNINO AESEAACH	4- 8	7 5/8	+ 1/4	+5.3
O	PROGAANNING & SYS	1- 1	3/4	0	0.0
D	RAPIDATA INC	3- 6	5 5/4	+ 1/8	+2.2
O	REYNOLDS & AEYNOLD	18- 28	27	0	0.0
D	SCIENTIPIC CONPUTERS	3- 6	5 1/2	+ 3/4	+15.7
O	TYMSHARE INC	18- 29	29	+5 3/8	+13.1
A	URS SYSTENS	5- 7	7 1/8	0	0.0
N	WVLV CORP	1- 5	4 1/8	+ 3/8	+10.0

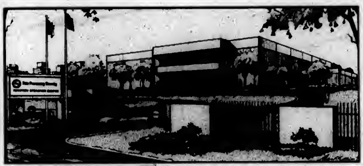
PERIPNERALS E SUBSYSTENS

EACH		PAICE			
		1978 RANBE 111	CLOSE AUB 2 1978	WEER NET CHNGE	WEER PCT CHNGE
N	ADDRBSSOGRAPH-NULT	14- 26	25 1/2	+1 3/4	+7.3
O	ADVANCED NENORY SYS	7- 16	13 1/2	+E 7/8	+13.7
N	ANPEX CORP	10- 17	16 1/4	+1 5/8	+11.1
O	ANDERSON JACOBSON	5- 10	9	- 5/8	-4.0
N	APPLIBD DIG DATA SYS	15- 18	15 1/4	+ 1/8	+0.8
O	BEEHIVE INT'L	4- 7	6	0	0.0
A	BOLT.BEAANER E NEW	6- 11	8 7/8	+1	+12.6
N	BUNKER-RAND	10- 18	17 5/8	+ 5/8	+3.6
A	CALCONP	3- 10	9 5/8	+ 5/4	+8.4
O	CANBRIDGE NENORIES	3- 8	8 5/8	+ 3/4	+13.5
N	CENTRONICS DATA CONP	16- 30	29 1/2	+1 3/4	+6.3
D	COGNITRONICS	E- 4	3 E/4	+ 1/4	+8.3
O	CONPUTER CONNUN.	6- 10	9 1/8	+ 5/8	+4.2
O	CONPUTER CONSOLES	4- 9	9	+1	+12.3
A	CONPUTER EQUIPNENT	3- 6	4 E/2	+ 1/8	+2.8
O	CONPUTER TRANSCBIVER	E- 2	1 5/8	+ 1/8	+8.3
D	CONTEN	9- 28	27 E/2	+E	+3.7
N	CONRAC CORP	19- 26	20 7/8	+1	+5.0
O	OATA ACCESS SYSTENS	3- 5	4 1/4	- E/4	-5.5
O	DATA 100	9- 20	19 7/8	0	0.0
A	OATA PROOUCTS CORP	15- 24	23	+1 1/8	+5.1
O	OATA TECHNOLOGY	4- 4	4 1/4	+ 1/4	+6.2
O	OATUN INC	2- 5	4 3/8	+ 1/8	+2.9
O	OECISION OATA CONPUT	2- 4	4	+ 3/8	+10.3
D	OELTA DATA SYSTENS	1- 1	1/2	- 1/8	-20.0
A	DOCUNATION INC	6- 27	26 7/8	+3 5/8	+15.5
D	OATAAAN CORP	6- 24	18 3/4	- 1/2	-2.5
N	ELECTAONIC N & N	4- 7	6 7/8	+ 3/4	+12.2
D	FABAI-TEA	1- 2	1 1/4	-	-4.8
O	GENERAL CONPUTEA SYS	1- 3	2 1/8	- 3/8	-15.0
N	HAZELTINE COAP	10- 16	14 7/8	+ 1/8	+0.8
N	HARRIS CORP	40- 64	64	+3	+4.9
O	INFOREX INC	6- 10	8 7/8	+ 3/4	+9.2
O	INFORNATION INTL INC	8- 11	10 1/2	+2 1/4	+27.2
O	INTEL CORP	39- 62	56	-6	-9.6
A	LUNDY BLECTRONICS	4- 5	5 1/8	+ 1/8	+2.5
O	NSI OATA CORP	12- 19	16 1/8	- 7/8	-5.1
N	NENOAER	27- 51	50 1/2	+5	+10.9
N	NOHAWA OATA SCI	6- 15	14 5/8	+ 7/8	+6.3
D	PENRIL COAP	5- 12	10	- 5/8	-5.8
N	PERTEC COAP	9- 14	12	+1 1/4	+11.8
A	POTTEA INSTRUNENT	2- 2	1 5/4	0	0.0
C	PAECISION INST.	2- 2	2	0	0.0
O	DUANTOR COAP	2- 5	2 3/4	- 1/4	-8.5
O	AECOGNITION BOUIP	7- 15	13 3/8	+1 1/4	+10.3
C	SCAN DATA	1- 5	4 3/4	+ 3/8	+8.5
N	STORAGE TECHNOLOGY	19- 46	27	+2 1/8	+8.5
O	T BAR INC	11- 19	16 1/2	+1	+6.4
O	TALLY CORP.	4- 9	7	- 1/8	-1.7
A	TEC INC	6- 11	10 1/2	- 3/8	-3.4
N	TERTRONIX INC	53- 45	44 3/4	+2 1/8	+4.9
N	TELEX	3- 7	5 5/8	+ 1/4	+4.8
D	TESDATA SYSTENS CP	13- 20	18	+ 3/4	+4.5
O	WILTEA INC	1- 1	1	0	0.0

SUPPLIES E ACCESSORIES

EXCH		PAICE			
		1978 RANGE 111	CLOSE AUG 2 1978	WEEA NET CHNGE	WEEA PCT CHNGG
A	ANERICAN BUS PRODS	6- 9	9 1/8	- 1/8	-1.5
O	BALTINOAE BUS FOANS	2- 5	3 1/2	0	0.0
A	BARRY WRIGHT	14- 28	27 1/4	+1 5/8	+6.3
O	CYBERNATICS INC	1- 1	1 3/8	0	0.0
D	DUPLEX PRODUCTS INC	18- 27	25 1/8	+ 1/4	+1.0
N	ENNIS BUS. PORNS	8- 17	15	+1 1/8	+8.1
N	3M COMPANY	43- 61	61 1/4	+3	+5.1
O	NOOAE CORP LTD	26- 34	51 1/2	-1 5/4	-5.2
N	NASHUA CORP	18- 51	50 3/4	+5	+10.8
C	STANDARD AEGISTEA	20- 26	23 1/2	+1 1/4	+5.6
A	TAB PROOUCTS CO	8- 13	12 5/4	+1 1/2	+13.5
A	UARCO	19- 27	24 1/4	+ 5/8	+2.6
A	WABASH NAGNETICS	10- 15	15 1/4	+1 1/4	+8.9
N	WALLACE BUS FOANS	18- 29	28 5/4	+1 3/4	+6.4

What you should know about Recovery Operation Centers --before it's too late.



Recovery Operation Centers to be built by Data Processing Security, Inc. will be able to accommodate a client's recovery needs in a matter of days.

These are not pretty words: Fire. Flood. Explosion. Earthquake. Tornado. Sabotage. And they don't mean pretty things.

What would happen to your company if one of these disasters struck your computer operations tomorrow? What would happen to cash flow? Business momentum? Customer service?

The truth is that a company not prepared to deal with a potential computer disaster could be *wiped out* in today's competitive business environment...and it could happen in minutes.

What we've learned

Data Processing Security, Inc., for a decade, has been dealing with these emerging problems ... counseling some of the most important names on the Fortune 500 list, as well as hundreds of other firms around the nation. One of our jobs has been to develop state-of-the-art contingency recovery plans.

We've learned something every company in America with a computer operation needs to know: The off-site Recovery Operation Center (ROC) is the answer to dealing with disaster problems that could otherwise literally stop a company in its tracks.

That is why DPS has developed the ROC. It's the answer to true disaster recovery. We will build five of them at regional centers across the nation.

It is not for everybody. A ROC is designed for companies dependent on their computers — those which can't afford to be down for an extended period of time while another computer facility is being built.

The time to investigate a recovery program such as this is now, when you don't need it.

But do investigate before you commit time and money to a backup computer facility. The following information will provide you with some basic information about Data Processing Security's ROC program.

What is a ROC?

A Recovery Operation Center is a pre-engineered, -designed and -constructed computer facility with the necessary telecommunications network, power supply, air conditioning, raised flooring, security and fire protection to accommodate immediate computer installation. Like a military command post, it is maintained in a constant state of readiness.

Today's computers are complex, sophisticated and highly specialized. There are three primary reasons why a ROC is necessary:

- **Availability:** Most companies, including Service Bureaus, operate their computer systems at or near capacity and simply cannot afford to provide necessary backup computer support to another company.
- **Compatibility:** Our experience has shown us that most companies lack computer compatibility, in both hardware and software.
- **Communications:** Again, experience has shown us that most communications networks are custom designed for a user's specific needs and no one else's.

  And these networks are rarely compatible with another firm's communications networks.

Because it effectively deals with these factors, a ROC is the most realistic, practical and cost-effective solution to reducing a company's exposure in the event of an unavoidable disaster.

Where will ROCs be located?

They will be located in the following areas (and developed in this sequence): Dallas/Fort Worth, Los Angeles, Chicago, New York, and Atlanta.

The first ROC, an approximately 50,000-square-foot facility, will be built in the Dallas/Fort Worth area. It is designed to accommodate three IBM 3033s (or their equivalents), plus it has the necessary operating space to support the data processing function. The cost to be a member of this backup computer facility will be $1,000 per month.

What if a disaster strikes a ROC?

This has been planned for, too. Each ROC will be connected to its counterpart in other parts of the country. This means that should a disaster strike Los Angeles, for example, its telecommunications network could be switched quickly to Dallas, or Atlanta, and business could be carried on as usual. There will be *no loss* of capability.

Will the ROC have a computer installed?

Not initially. However, after the ROC has been built, DPS will conduct a thorough feasibility study for those members interested in and requiring common systems. This approach has proved to be the most economical; ROC members pay for what they need and nothing more. If the study shows installation of a computer to be the best strategy, and if justified by costs, then a computer could be put into the ROC.

Be cautious about entering into a backup agreement with a Service Bureau because more than likely they will not be able to support your recovery needs for the extended period of time it will take to reconstruct or build a new computer facility.

What about delivery of computer and communications systems?

DPS will assist ROC members in negotiating with their respective computer manufacturers to expedite the shipment of their replacement computers within the critical response times necessary in the event of a disaster.

DPS also will assist ROC members, after reviewing their telecommunications needs, to secure and install common types of modems and communications equipment. An analysis of these needs will indicate which members can share common data communications systems.

Don't wait until it's too late! If your company depends upon its computer system for daily operations, then you must realize what could happen if you didn't have that capability.

For more information about the Recovery Operation Centers and what they can mean to *your* business, write or call Data Processing Security, Inc., (817) 589-2244.

DPS is the leading management consultant in computer security, the proven name, advancing the state of the art through its work with 400 major corporations.

Data Processing Security
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